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ANTHONY POLLOK PRIZE NOT AWARDED.

The second competition for the prize offered by the heirs of the late Mr. Anthony Pollok, who lost his life on the occasion of the collision between the French steamer La Bourgogne and the British sailer Cromartyshire, off Sable island on July 4, 1898, was opened at Havre on the 9th ult. and closed on the 21st. In memory of their relative it will be remembered that Mr. Pollok's heirs (Messrs. Osthemer, Richemont and Paraf) determined to do what they could to prevent a recurrence of such catastrophes, and with this object in view set apart the sum of 100,000 francs as a reward for the invention of the most effectual means of preventing collisions at sea, preserving vessels in case of collision and saving, in a body, the crew and passengers in case of a wreck. The first competition was held last year, but, in spite of the emulation manifested by inventors on the occasion of the Paris exhibition, none of the apparatus designed fulfilled the conditions laid down by the jury, and the prize was not awarded. Under the auspices of the Havre chamber of commerce, therefore, a fresh competition was instituted, and Capt. S. Dechaille, director of the signaling and life saving service, was appointed to take the practical management of the affair. The result is the exhibition now being held in one of the sheds on the Quai de Marseille at Havre, of a large collection (238 in all) of apparatus, models, and designs for securing the safety of ships and of persons traveling by them. The conditions imposed on competitors are very severe, the prize-givers being desirous, above all things, of rewarding the inventor of some apparatus capable of being utilized by all on board ship collectively without the slightest delay. Everything not answering to this indispensable condition was therefore excluded from the competition. Such old-fashioned objects for the safety of individuals as belts, waistcoats, buoys, etc., were consequently ruled out, and some of the other things excluded were: Objects standing or lying about on deck, blocking up the space reserved for passengers or goods and obstructing the loading and discharging operations; inventions which, taken by themselves, would simply be an improvement of systems already recognized as inadequate for saving life "collectively;" also floats, rafts, etc., requiring to be set up, put together, or inflated at the moment of danger. It will be seen, therefore, that the field open to competitors for the prize is very restricted indeed, and, according to information from Havre, very few models and designs complying with the conditions have been sent in. A large number of inventors have evidently competed, not with the idea of gaining the prize, but with the object of bringing their inventions to the notice of ship owners, ship builders, and mariners. Not many new ideas have been conceived on the subject of preventing collisions, but there is one which consists of a "warning torpedo," which, connected by a cable to a vessel, and worked by electricity, keeps a certain distance ahead and sends back a warning if it strikes against anything in its course. There are also several models of balloons and other defences to be placed over the bows of vessels for deadening the shock of a collision, and one inventer even places buffers all round a ship, while another proposes to provide vessels with a pair of iron wings which shall unfold and drop automatically into the water and stop the course almost immediately. It is not possible, however, to give a detailed account of the proposals, more or less practicable, made by inventors. Suffice it to say that in the third category—the "collective" saving of life—the models sent in are for the most part of improved rafts, roofs, floating benches, and buoys. The jury is composed of representatives of France, England, Germany, Holland, Norway, Denmark, Italy, Sweden, Russia and the United States. A Spanish representative was also nominated, but his health would not permit of his taking any part in the proceedings.

The international jury began its examination of the models and plans on the 9th and concluded on the 13th. After rejecting a great number of inventions as not complying with the conditions laid down, the jury, "while acknowledging the efforts made to provide a greater degree of security in navigation, decided that none of the proposals presented answered to at least one of the three conditions imposed by the founders of the Anthony Pollok competition, and therefore the prize would not be awarded."

SEASON CLOSING FAVORABLE TO VESSELS.

It is now more than probable that the vessel interests of the great lakes will again be favored this year with a strong closing of the navigation season—improved freights—and that the total output of iron ore from the Lake Superior region, including rail shipments of a few hundred thousand tons, will pass the twenty-million ton mark. Official figures regarding the ore movement to Oct. 1 are not as yet at hand, but reports from Lake Superior points show gains sufficient to look for a twenty-million-ton output for the full season. The output last year was just a trifle in excess of nineteen millions. Although the fall movement of grain from the northwest can hardly be said to have thus far reached expectations, vessels are meeting with so much delay in other lines, due to inability of railroads to care for the business at Lake Erie ports, that advances have been recorded during the past week in both ore and coal freights. The rate on ore from the head of Lake Superior has been put up to 90 cents and the Lake Michigan coal rate to 60 cents for both hard and soft coal, and the tendency is still upward.

Reports from iron and steel centers are all of an encouraging kind. The buying movement has been heavier in the past week than for several months past. Improvement was started by buying of pig iron on the part of the big corporations. From Pittsburg and the Mahoning valley it is reported that the furnaces have sold practically their entire capacity to the first of the year. Railroads have followed up the early purchases of steel rails to such an extent that there is already some doubt regarding the ability of the mills to supply next year's requirements. It is estimated that orders already placed for rails to be rolled after the first of January aggregate 800,000 tons.

STEEL CORPORATION EARNINGS.

What may almost be termed a new departure in the methods of industrial corporation management, and a departure that was commented on very favorably in Wall street, was the action of the directors of the United States Steel Corporation this week in giving to the public a financial statement showing in detail the operations of the company for the first six months of its history. The statement was made public after the meeting of the directors at which the regular quarterly dividend of 1¾ per cent on the preferred stock and of 1 per cent on the common stock was declared. The meeting ended after business on the New York stock exchange had ceased. The following is the Steel Corporation's statement:

	Net earnings from operation.	
April	$7,356,744	
May	9,612,349	
June	9,394,747	
July	9,580,151	
August	9,810,880	
September (estimated)	9,200,000	
Total		$54,954,871
Less total of amounts set aside for sinking funds and maintenance		7,059,705
Balance		$47,895,166
Six months' interest on bonds		7,600,000
Balance		$40,295,166
FIRST QUARTERLY DIVIDEND ON STOCK, DECLARED JULY 2:		
Preferred, 1¾ per cent.	$8,895,913	
Common, 1 per cent.	5,061,115	
Total		$13,957,028
Balance		$26,338,138
SECOND QUARTERLY DIVIDEND ON STOCK, DECLARED OCT. 1:		
Preferred, 1¾ per cent.	$8,929,049	
Common, 1 per cent.	5,082,347	
Total		$14,011,396
Balance applicable to surplus or new construction as the board of directors may decide at end of year		$12,326,742

The dividend on the preferred stock is payable Nov. 6 and the transfer books close Oct. 15. The common stock dividend is payable Dec. 20 and the books close Nov. 19. One of the features worthy of comment is the fact that the strike of the Amalgamated Association had no appreciable effect upon earnings. The time was utilized to make necessary repairs upon the plants, a duty which usually falls to midsummer. Moreover, the work which would have been done by the closed plants was transferred to the active mills, and therefore practically no time whatever was lost.

THE NEW ARMORED CRUISERS.

Although the essential details of the design for the two armored cruisers to be appropriated for by the next congress in connection with the program for naval increase have been decided upon by the board on naval construction, there is still some question as to whether these two vessels will be provided with twin or triple screws. For many years it has been the contention of the chief of the bureau of steam engineering that ships of this type should be provided with triple screws. Other members of the board are inclined to disagree with Admiral Melville, and consequently there is at present a warm discussion in progress on the question. The advocates of the triple screw hold that they are not only more economical than the twin screws, but that they add speed and make it possible to handle the ship with greater facility. It is also contended that in the case of one screw being disabled in a twin-screw vessel, the speed would be greatly reduced, while in a triple-screw ship the breaking of one screw would not seriously affect the speed of the vessel.

Naval experts claim that no matter how the screw problem is settled, the two armored cruisers as designed by the board on construction will be superior to any ships of their class ever constructed by any naval power. In fact, it is said, the vessels will more nearly approach in their fighting efficiency the battleship class, but will, of course, have the much greater speed of the armored cruiser. They will have a speed of 23 knots, being the fastest vessels of their class ever designed for the navy. As designed they are to have armor belts and side armor of almost equal thickness to the new battleships, and the battery will be the heaviest ever placed on ships of their displacement. The new 7-in. gun will predominate in the main battery, and the secondary battery will be of great power.

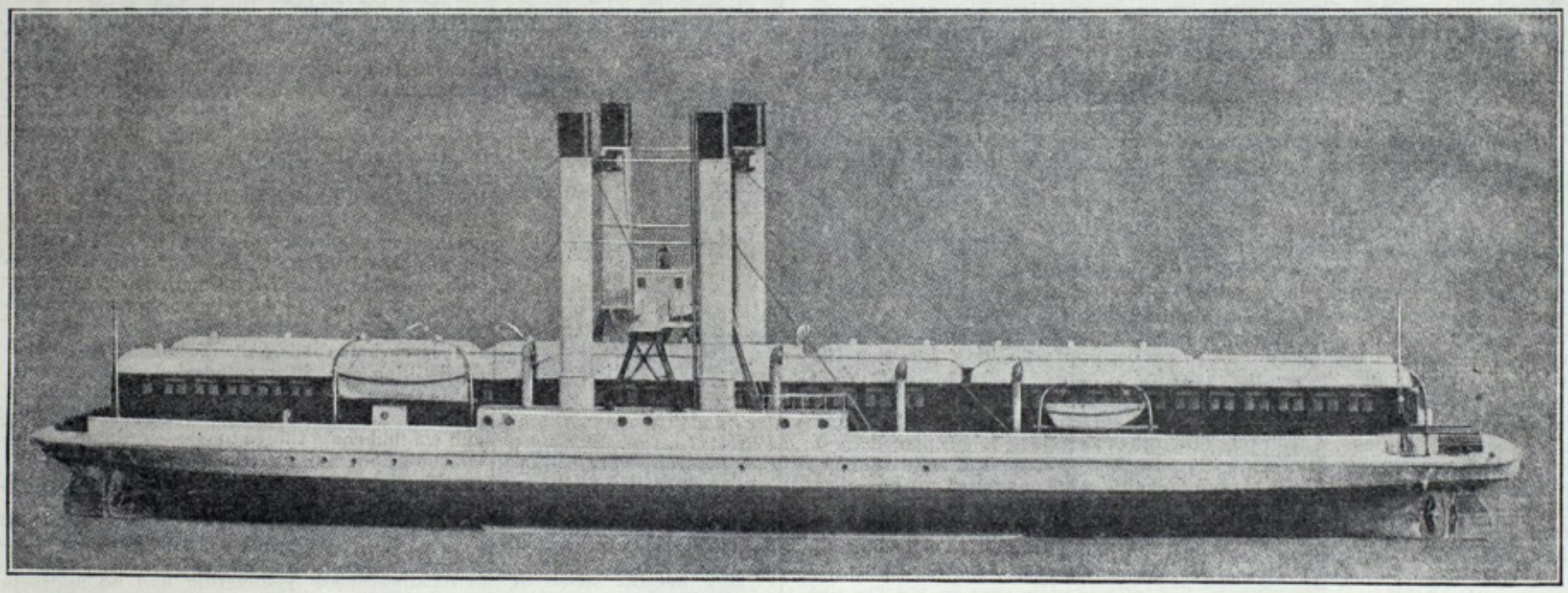
A conference was held in Boston on Tuesday of this week at which the draft of the new shipping bill, which it is proposed to present to congress early in December, was considered. The bill will not differ radically from that presented to the last congress, but it will embrace certain features to make it acceptable to those who opposed the last bill. The fight last winter centered about the provision to pay a subsidy to foreign-built ships owned wholly or in part by Americans, and it is probable that this feature will be amended.

RAILWAY FERRY SCOTIA.

The Review lately gave a description of the railway ferry steamer and ice-breaker Scotia, recently completed at the Walker ship yard of Sir W. G. Armstrong, Whitworth & Co., Ltd., to the order of the minister of marine and railways of the Dominion government for service across the Straits of Canso to and from Port Mulgrave in Nova Scotia. It is now enabled to give an illustration of the vessel designed from a model. The vessel is constructed as an ice-breaker to enable her to cope with the large masses of ice that drift into the straits with the tides and winds during the winter months. The Scotia is capable of carrying a load of nine Pullman cars, each 84 ft. 6 in. long, or a correspondingly large number of box goods cars. She is specially strengthened for the conveyance of an express locomotive and tender weighing not less than 118 tons. Arrangements are made so that the trains can come on board the vessel at one end and leave at the other when the opposite shore is reached, three sets of rails being laid along her decks, so that three trains can be carried at once.

By a special arrangement of gearing worked from the deck, the pins connecting the steering gear to the rudder are simultaneously connected, and the pin securing the rudder in a central position when going ahead is withdrawn, so that when the rudder is at the after end of the ship, for the time being, it is ready to steer the vessel, and when for the time being it is at the fore end, a locking-pin holds the rudder securely in a central fore-and-aft direction. As it is clear that the rudder will be exposed to very rough treatment, and to prevent it being smashed by contact with ice, it is made of cast steel of very exceptional thickness and strength, whilst the rudder-plate itself is of abnormal strength, the whole being so designed in form and section as to, it is hoped, successfully withstand the attack when ramming ice. The propellers, in the case of all the ice-breakers which have been built at Elswick, have been made of a very special mixture of nickel steel, which provides for great strength, and, of course, the shafting and actions of the propeller blades are specially designed for strength, and of a form to withstand the strains set up when ice-breaking; the basis of which may be taken that the propeller and its shaft must be of sufficient strength to allow of the whole thing being brought up dead, and, of course, the machinery in like manner has also to fulfill the same condition. With all the Elswick ice-breakers this has been most successfully carried out.

The vessel has been tried on the measured mile at Whitley, off the mouth of the Tyne, with weights on board to bring her to her working load, and in the trial the vessel proved herself capable of fulfilling the conditions provided in the contract, both in regard to speed and the power necessary for ice-breaking. The machinery consists of two sets of triple-expansion engines, each of 1,200 H.P., with four cylindrical boilers working at a pressure of 160 lbs. The shafting is continuous from end to end of the vessel. The propelling machinery has been constructed by the Wallsend Slipway & Engineering Co., Ltd. At the end of the vessel there is an ice-breaking propeller, and there are also rudders at each end to enable the ship to be handled in either direction at will. It is believed that the vessel will prove an immense advantage to the fast colonial service between the Island of Cape Breton and the mainland.



RAILWAY FERRY SCOTIA FOR THE STRAITS OF CANSO.

WHICH IS PREFERABLE, LIGHT-SHIP OR LIGHT-HOUSE?

The Lake Carriers' Association has written to the United States light-house board asking for an investigation of the necessity for a light-house or light-ship on Southeast shoal, Point au Pelee passage, Lake Erie, and the letter has been referred to Maj. T. W. Symons, engineer, and Commander Andrew Dunlap, inspector, of the tenth light-house district at Buffalo, N. Y., for investigation and report. The letter is written with the hope that during the coming session of congress money may be appropriated for the erection of the needed aid to navigation.

The officers making the investigation are very desirous of receiving any information bearing upon the subject, and as well, the views of mariners and people interested in the navigation through this passage, as to which is preferable, a light-house or a light-ship. Any communication addressed to either one of the officers named bearing upon this subject will be gladly received and noted.

The Fulton Engineering Works, San Francisco, Cal., is building for the Ship Owners' Tugboat Co. a tug 135 ft. long, to be known as the Sea Otter.

COMPLAINING OF LUMBER LOSSES.

Buffalo, Oct. 1.—"One thing is certain," said a Buffalo marine insurance man to another a few days ago, "and that is, we must change our style of writing risks on lumber cargoes. We are losing too much money on low-valuation boats. We shall have to write by valuation instead of by class and it is high time the change was made."

It is no news that the lake losses this season are not merely puzzling the lake underwriter. They are fairly alarming him. He sees a season without a large percentage of violent storms, one with about the average prospects for insurance, at least as it seems to the lay mind, yet it is well known that with the season just entering on its worst period the earnings are already fairly gone. It is surely time that something was done.

I am not going to enter into statistics in the effort to show what the lake losses are, for the general statement is quite as convincing as anything, and besides an insurance agent never knows what his losses are at any time, least of all during the course of the season. Even at the end of the calendar year, with the fleet laid up nearly a month, the figures obtainable are always deceptive, so many claims still come in that have never been heard of at the time the accidents occurred.

But the lumber losses this season have been something remarkable in a season that is proving remarkable all round. In a long period of reporting in lumber as well as marine I have no recollection of so many accidents to lumber cargoes. Here is an off-hand list, by no means complete, of loaded lumber carriers in trouble this season, all, so far as I recall, bound for Lake Erie ports: The barges Myron Butman, Keweenaw, Oneonta, Jupiter, Wesley; the schooner Grace Gribbie; the steamers Meriden and E. H. Strong, the last at first supposed to be a total loss, and at the best a heavy partial loss. Some of the list have incurred loss to the underwriters more than once this season, and as to the completeness of the list any lake man looking at the above could suggest additions to it.

The change proposed by the insurance man, looking towards a remedy, is based on the experience of this season more especially. Insurance rates on low-class vessels have become so high of late that a great part of the lumber fleet is not insured at all, so that when a risk is written on a cargo there is no one to co-operate with the underwriter when the boat gets into trouble but the owner. If the loss is likely to be heavy, or the owner is low in funds, the chances are that he will sit down and let the cargo insurance look after the loss alone, or he will insist on some wrecking plan that will throw most of the cost on the cargo. This latter course in one instance nearly led to a lawsuit this season.

It is perhaps hard to say why the use of better lake vessels, as is now the case in all classes but lumber, has not lowered the cost of insurance and made it easy to obtain capital in the business of late. Facts are not subject to dispute, when they are so plain as this, but it would seem that only one class of loss ought to be on the increase, and that is collision. That this sort of accident has played a considerable part in lumber losses this season is true.

It is not at all certain that the valuation idea will be adopted by underwriters. It is taken up here merely as an indication that there is confessed to be loss instead of the usual profit in cargo insurance this season. With the owner of the vessel a full party to the work of saving her when in trouble the case would be much simpler than it is, and such would be the case with vessels of fair valuation, but there is another question to consider. The change would drive not a few lumber boats out of business, for as soon as their cargoes are uninsurable they can get no cargoes.

The lumber fleet is small, as shown by the fact that the usual mid-summer effort on the part of lumbermen to crowd rates down failed this season. There are fairly a dozen lumber-barge owners figuring on the purchase of the partly burned steamers Avon and Hennepin, now in Buffalo harbor, thus proving the fact from another direction.

JOHN CHAMBERLIN.

A novel piece of machinery on which the Brown Hoisting Machinery Co. of Cleveland is working is a 100-ton pontoon crane for the Brooklyn navy yard, intended for loading guns or heavy machinery into warships. It rests on a pontoon 60 by 100 ft. and has an overhang at either end of 45 ft., the total length of travel being 190 ft. At 45 ft. overhang the crane has a lifting capacity of 100 tons. The crane is provided with automatic counterweights, so that the pontoon only lists 3 in. in picking up a 100-ton load. The pontoon is being built by the Cramps, Philadelphia, and the outfit will be completed sometime this fall.

UPWARD MOVEMENT OF WAGES.

Engineering of London, in discussing the recent records of the labor department of the British board of trade, says:

The United Kingdom has wiped out the reproach of being far behind America in the matter of labor statistics. Our records do not go back so far as those of various bureaus of labor in the United States, some of which were in full working order in the early sixties; but, for up-to-date facts, the recent records of the labor department of the board of trade will bear comparison with those issued in America. In one respect, however, we are still behind, namely, in international labor statistics. We have even now to go back to some of the earlier reports of the American bureaus for facts and figures relating to the condition of labor in the chief European countries.

The eighth of a series of reports on the changes in the rates of wages and hours of labor in 1900 has just been issued. It is full of matter, and the tables are skilfully arranged, so that the full effect of the various changes can be seen at a glance. It appears that wages attained a higher level in 1900 than in any year for which statistics exist. This is a gratifying fact from the standpoint alone, if for no other, that it indicates prosperous trade. Wages can only rise when labor is in demand and employment is remunerative. Employers do not, as a rule, employ work-people unless there is a profit upon the employment. That profit may be small, in some cases even to vanishing point; but labor must be remunerative, or it will speedily cease. When employers are pressed with orders, the question of wages becomes secondary. If the demand for an advance is unduly large, there is resistance; but the employer will not, as a rule, risk a stoppage of the work unless there are strong reasons for so doing. The degree of profit decides the question.

The chief commissioner of labor, Mr. Llewellyn Smith, says: "The year 1900 was the culminating point of the upward movement of wages which began in 1896. Not only did the general level of wages in the United Kingdom stand higher at the end of 1900 than in any year for which statistics exist, but the rate of increase during last year was unprecedently high. If we confine ourselves to the industries for which it is possible to obtain definite statistics, we find that no fewer than 1,112,684 work-people, or about one-seventh of the total employed, received advances during the year amounting to no less than £212,000 per week, while only 23,010 sustained decreases to the unimportant amount of £2,800 per week. The net weekly rise (in wages) of £209,000 compares favorably with £91,000 in 1899 and £81,000 in 1898." He goes on to say that by far the larger amount of the total increase went to the miners, whose wages advanced on the average nearly 4s. 5d. per week, the aggregate being £168,000, or about 80 per cent. of the total weekly increase in wages. The commissioner estimates that the total increase in 1900 amounted to no less than £6,000,000 in wages alone. It is significant that although the changes in wages were numerous and the alterations in the aggregate great, they were nearly all effected without strikes involving a stoppage of work. Only about 5 per cent. of the total changes were preceded by strikes. The other 95 per cent. were effected by peaceful means, by sliding scales, boards of conciliation, direct negotiation, and similar methods. This is especially gratifying, for it indicates that both sides are tired of the wasteful industrial warfare, in the shape of strikes and lockouts, and that a better system is at least being tried.

Although some signs of decline in trade were visible towards the end of 1900, the year as a whole was characterized by good trade, steady employment, high rates of wages, and freedom from serious labor disputes of any magnitude, the quarrymen's dispute being an exception. The increase in the weekly wages bill was nearly £215,000 per week. The proportionate distribution of the increase is shown by the following table, in groups of trades:

AVERAGES BASED ON TOTAL NUMBER EMPLOYED IN GROUPS OF TRADES.

Groups of Trades.	Total increase per week. £	Weekly average increase per head. s.	d.
Mining and quarrying	168,362	3	10¾
Engineering, ship building, and metal trades.	16,285	0	3¼
Building trades	6,640	0	2
Textile trades	6,010	0	1¼
Agricultural labor	9,939	0	1¾
Railway employes*	4,503	0	2¼
Seamen (A. B.'s and firemen†)	38	0	0⅛
All other trades	12,076	0	0¾
Total	214,771	0	5¼

*Group 6 represents a decrease based on earnings, and †group 7 a decrease.

In a further table it is shown to what extent the work-people participated in the increase of wages. The figures work out thus: In mining and quarrying, 705,437—proportion of total employed, 81.8; in the textile trades, 125,089—proportion, 10.3; engineering, ship building, etc., 95,285—proportion, 7.9; building trades, 78,600—proportion, 9.6; employes of public authorities, 31,743; and miscellaneous trades, 91,151—proportion (both inclusive) 3.7; clothing trades, 8,481—proportion, 1.4. The aggregate participating was 1,135,786 work-people, the proportion being 14.2 per cent. of the total employed. This total and the proportion are exclusive of agricultural laborers, and of the railway employes and seamen, who suffered decreases, as shown in the above table.

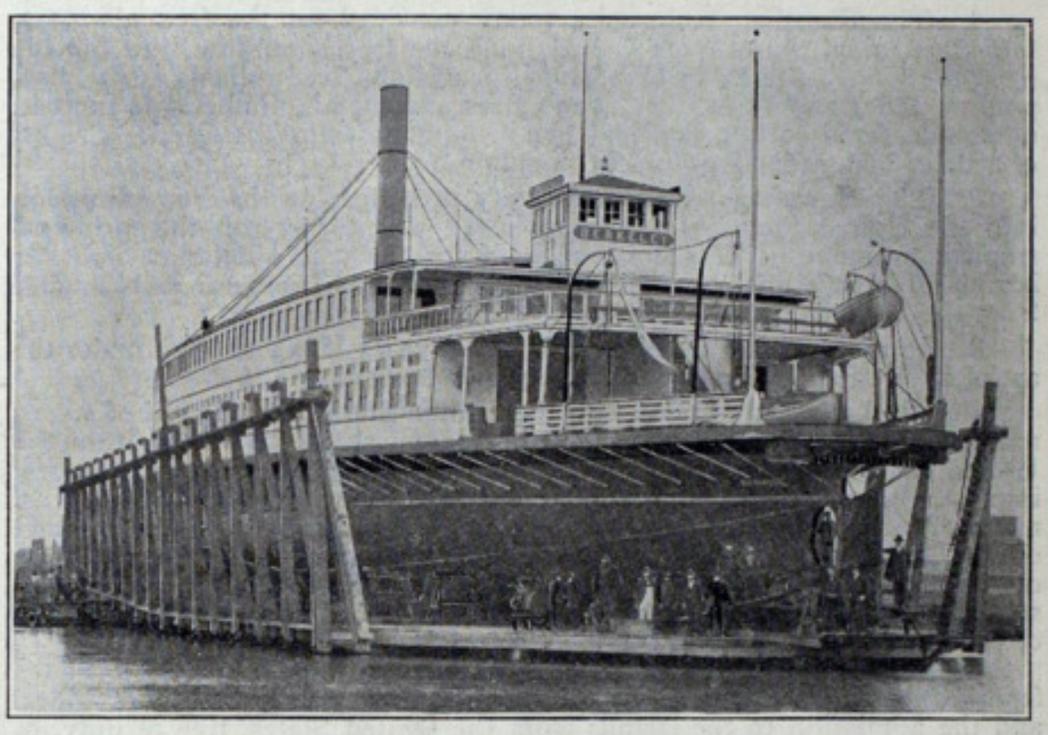
The total increase in wages is given as £209,373 net, or an average increase in weekly wages of 3s. 8¼d. per head. The corresponding figures for 1899 were £1,176,000 work-people whose average increase in wages amounted to 1s. 6½d. per head per week. The total number participating in each year was nearly the same, but in 1900 the average advance in wages per head was more than double. The methods of settlement are shown by the following table:

Modes of settlement.	Total number affected.	Percentages
Sliding scale	183,889	15
Conciliation boards, etc.	480,157	42
Direct negotiation between the parties	471,740	42
Total and proportion	1,135,736	100

The figures given are reproduced in a variety of ways as pertaining to the several groups, to proportions and comparisons by years, so that every aspect of the changes is presented to the reader. Reductions in the hours of labor were comparatively few. Only 57,726 work-people were affected. The aggregate working hours reduced were 238,043, or in proportion 4.12 hours per week per head of those affected. The chief reduction was in Lanarkshire, where 26,500 miners reduced their hours by six per week, having adopted the eight hours' system. The London county council reduced the hours of 1,510 tramway employes six per week, and 8,000 cabinet makers in London had their hours reduced two and one-half hours per week. The eight hours' day was adopted in private establishments employing 27,643 work-people, and by public authorities employing sixty-five persons. Altogether 27,708 work-people adopted the eight hours' day. Here, again, the Lanarkshire miners swell the total. Exclusive of those, only 1,268 adopted the eight hours' system in 1900. In eight years the eight hours' system had been adopted by 100,780 work-people, while in the same period 1,432 reverted from the eight hours to the longer working hours in force before its adoption.

A SUCCESSFUL MARINE RAILWAY.

W. A. Boole & Son of San Francisco are highly pleased with the marine railway shown in the accompanying engraving and which bears the large ferry steamer Berkeley, described and illustrated a short time ago in these columns. This railway was designed and built by H. I. Crandall



& Son Co., engineers, of East Boston, Mass., who make a specialty of this kind of work and have been highly successful in all such undertakings. The capacity is 3,000 tons. The cradle is capable of hauling out vessels of 300 ft. length and 74 ft. width over guards. It is operated by a system of quadruple chains patented by the Crandall company.

HISTORY OF PIG IRON IN SCOTLAND.

The manufacture of pig iron in Scotland has had an interesting history. There is evidence to show that as early as 1686 the trade of iron founding was introduced in Scotland "for casting of balls, cannons and such other useful instruments." Two charcoal furnaces were established in Argyleshire about 1750, and in 1759 the Carron Iron Works, near Falkirk, were established with one charcoal blast furnace, the power being supplied by water engines, which were designed by Smeaton, and of which a full account will be found in Smeaton's life. Down to 1788, however, the total make of pig iron in Scotland did not exceed 1,500 tons, while it is stated by a recent writer that there were, about the same time, one forge and three refineries at work producing some 240 tons of bar iron annually. By the year 1892 Carron had five blast furnaces, four forges, and numerous appliances for the manufacture of small cannon or "Carronades," for which the works had acquired a great reputation.

About 1830, when Neilson introduced the hot blast, there were twenty-seven blast furnaces built in Scotland, which are stated to have made about 37,500 tons of pig. This discovery, with its consequent increase of output and economy of fuel, gave a great impulse to the pig iron industry—so much so that in the succeeding ten years Scotland saw twenty-four new works erected for the manufacture of pig iron, and numerous other works for the manufacture of malleable iron. The development of the pig iron industry may be said to have reached its culminating point about 1845, since which scarcely any new works have been constructed, although new blast furnaces have been added to several alreay existing works.

Between 1830, when the hot blast was introduced, and 1855 the pig iron industry of Scotland had a very rapid development, rising from an output of 37,500 tons to 820,000 tons a year. From the latter date, however, the progress was much less rapid, and it culminated in an output of 1,206,000 tons in 1870, since which time the trade has more or less fallen off. It is some years now since the make of pig iron in Scotland was much above a million tons a year, and in 1893 the output was only 793,000 tons. The output of pig iron for the last three years has been above a million tons annually. The home output is supplemented by considerable and yearly increasing imports, mainly from the Middlesbrough district. The annual consumption of the district may be taken as close on a million and a half tons a year, of which about a million tons is used in the steel industry, and about 300,000 tons in the finished iron industry, which still produces from 200,000 to 250,000 tons of puddled bars a year.—Iron and Coal Trades' Review.

A British admiralty chart, Midland section of Georgian bay, will be sent, postpaid, to any address for $1.25; regular price $1.75. Size of sheet 3x4 ft. The Marine Review Pub. Co., Perry-Payne building, Cleveland. Chart of the whole bay on one sheet at the same price.

THE THREE RECIPROCAL TREATIES.

TABLES SHOWING WHAT THEIR EFFECT HAS BEEN UPON THE COMMERCE OF THE UNITED STATES DURING THEIR EXISTENCE.

The practical experiences of the United States with reciprocity are told by some figures and statements just compiled by the treasury bureau of statistics. It seems almost like a message that President McKinley's last words should have been a plea for the extension of reciprocal relations. There have been three distinct tests of reciprocity in the trade relations of the United States. These are:

1. The reciprocity treaty with Canada, existing from 1854 to 1866.

2. The reciprocity treaty with the Hawaiian government, existing from 1876 to the date of annexation, 1898.

3. The series of treaties framed under the McKinley tariff act of 1890, beginning with the treaty with Brazil, April 1, 1891; Dominican republic, Aug. 1, 1891; Spain, for Cuba and Porto Rico, Sept. 1, 1891; Germany, Feb. 1, 1892; United Kingdom, for the British West Indies and British Guiana, Feb. 1, 1892; Nicaragua, April 15, 1892; Austria-Hungary, May 25, 1892; Honduras, May 25, 1892, and Guatemala, May 30, 1892.

These continued in existence until the passage of the Wilson tariff act, Aug. 27, 1894. The detailed provisions of these various reciprocity treaties may be briefly described in general terms as follows:

1. The Canadian reciprocity treaty provided for the free admission into the United States from Canada, and the free admission into Canada from the United States, of breadstuffs, provisions, live animals, fruits, fish, poultry, hides and skins, furs, stone, ores and metals, timber and lumber, unmanufactured cotton, flax and hemp, unmanufactured tobacco—the list of articles being identical for each country.

2. The Hawaiian reciprocity treaty provided for the free admission into the United States of sugar, molasses and other of the principal tropical productions of the island, and for the free admission into the islands of breadstuffs, provisions, manufactures and general merchandise from the United States.

3. In the group of treaties made in the years 1891 and 1892, under the act of 1890, the provisions were briefly as follows:

Brazil, the free admission into the United States from Brazil of sugar, molasses, coffee and hides, and the free admission into Brazil from the United States of breadstuffs, pork, fish, cottonseed oil, coal, agricultural implements, machinery for mining and manufacturing, mechanical tools, material for railway construction and numerous other articles, the product of the United States; also for a 25 per cent reduction in the rates of duty on certain other articles including provisions, manufactures of iron and steel, leather, lumber, furniture, wagons and carriages and manufactures of rubber.

Cuba and Porto Rico, the free admission into the United States from Cuba and Porto Rico of sugar, molasses, coffee and hides, and the admission to the islands from the United States, free of duty, of salted meats, fish, lard, woods for cooperage and manufactured into doors, frames, etc., wagons and carts, cars for railways, sewing machines, manufactures of iron and steel, oats and forage and numerous other articles, the product of the United States; also corn and meal at 25 cents per hundred kilograms, wheat at 30 cents per hundred kilograms, flour at $1 per hundred kilograms and also a reduction of 50 per cent of the duty on numerous other articles, especially manufactures.

With British West Indies the treaty provided for the free admission into the United States of sugar, molasses, coffee and hides from the islands, and the free admission into the islands from the United States of live animals, canned or dried beef, fish, eggs, machinery for agriculture, irrigation and mining, carts and wagons, wire, railway material and locomotives, fertilizers, fruits, sewing machines and a large number of manufactures and also a reduction of 25 per cent in the rates of duty on beef and pork salted and provisions, and of 50 per cent on bacon and hams, lard, bread and biscuits, boots and shoes, shooks and staves and other articles.

With the Dominican republic and British Guiana, Nicaragua, Honduras and Guatemala, the provisions were similar to those with the West Indies. With Germany the treaty provided for the free admission into the United States of sugar, molasses, coffee and hides from Germany and the free admission into Germany from the United States of bran, flax, feathers, hides and skins, tan bark, also a large list of articles at a fixed rate of duty but in all cases below the regular tariff rates—the list including breadstuffs, lumber, provisions, live animals, fruits and certain manufactures. The treaty with Austria-Hungary was similar in general characteristics with that of Germany.

The tables which follow show the commerce between the United States and the countries in question during the existence of the reciprocity treaties and the two years prior and subsequent to the existence of those treaties:

CANADA.

(Treaty existed from Sept. 11, 1854, to March 17, 1866, with commerce of two years preceding and following that period.)

Fiscal years.	Imports into U. S. from Canada.	Exports from U. S. to Canada.
1852	$ 5,469,445	$10,229,608
1853	6,527,559	12,432,597
1854	8,784,412	24,073,408
1855	15,118,289	27,741,808
1856	21,276,614	29,025,349
1857	22,108,916	24,138,482
1858	15,784,836	23,604,526
1859	19,287,565	28,109,494
1860	23,572,796	22,695,928
1861	22,724,489	22,676,513
1862	18,511,025	20,573,070
1863	17,484,786	27,619,814
1864	29,608,736	26,574,624
1865	33,264,403	28,829,402
*1866	48,528,628	24,828,880
1867	25,044,005	21,020,802
1868	26,261,379	24,080,777

*1866, nine months of year under reciprocity.

HAWAIIAN ISLANDS.

(Treaty existed from 1876 to 1898, with commerce of two years preceding and following that period.)

Fiscal years.	Imports into U. S. from H. I.	Exports from U. S. to H. I.
1874	$ 1,016,952	$ 614,628
1875	1,373,681	662,164
1876	1,227,191	779,257
1877	2,250,335	1,272,949
1878	2,678,830	1,736,099
1879	3,257,938	2,374,918
1880	4,600,444	2,086,170
1885	8,857,497	2,787,922
1890	12,313,908	4,711,417
1895	7,888,961	3,723,057
1896	11,757,704	3,985,707
1897	13,687,790	4,690,075
1898	17,187,380	5,907,155
1899	17,831,463	9,305,470
1900	20,707,903	13,509,148

CUBA AND PORTO RICO.

(Treaty existed from Sept. 1, 1891, to Aug. 27, 1894, with commerce of two years preceding and following that period.)

Fiscal years.	Imports into U. S. from C. & P. R.	Exports from U. S. to C. & P. R.
1889	$55,837,996	$13,916,242
1890	57,855,217	15,381,943
1891	64,878,505	14,380,122
1892	81,179,678	20,809,573
1893	82,715,129	28,165,291
1894	78,813,893	22,845,839
1895	54,377,871	14,641,205
1896	42,314,883	9,632,974

BRITISH WEST INDIES.

(Treaty existed from Feb. 1, 1892, to Aug. 27, 1894, with commerce of two years preceding and following that period.)

Fiscal years.	Imports into U. S. from B. W. I.	Exports from U. S. to B. W. I.
1890	$14,855,018	$ 8,288,686
1891	16,293,184	9,779,138
1892	12,992,447	9,038,376
1893	16,788,438	9,006,962
1894	13,461,773	9,440,892
1895	10,243,151	8,585,742
1896	11,323,292	9,658,200

GERMANY.

(Treaty existed from Feb., 1892, to Aug. 27, 1894, with commerce for two years preceding and following that period.)

Fiscal years.	Imports into U. S. from Germany.	Exports from U. S. to Germany.
1890	$98,837,683	$ 85,563,312
1891	97,316,383	92,795,456
1892	82,907,553	105,521,558
1893	96,210,203	83,578,988
1894	69,387,905	92,357,163
1895	81,014,065	92,053,753
1896	94,240,833	97,897,197

The reciprocity treaties now in existence, framed under the Dingley tariff, were made on the following dates respectively: France, May 30, 1898; Portugal, June 12, 1900; Germany, July 10, 1900; Italy, July 18, 1900.

The American Ship Windlass Co., Providence, R. I., has just furnished two large electric gypseys to the New York, New Haven & Hartford Railroad, to be used on Oak Point pier on the Harlem river. The water at this pier is very deep and the current is strong, and the railroad company will use these powerful electric gypseys to pull boats up to the wharf. They are capable of exerting 75,000 lbs. pull. The Providence company is also building an electric capstan, which is nearly ready to ship, for the New York Ship Building Co. of Camden, N. J., for hauling railroad cars. The Providence electric gypsey is being put to new use by the Pennsylvania Railroad Co. at its Desbrosses street ferry, New York city. It is to overcome the intense strain that teams with heavily loaded trucks are subject to while ascending the steep inclines of ferry bridges during low tide. The gypsey is located at the outer end of the stringer which divides the upper and lower gangways. When a team is unable to ascend the bridge the rope is run down and attached by a hook to the tongue of the truck; two turns are then taken around the gypsey and power is applied by means of a handle connected with a motor box, exactly the same as that used on trolley cars. The Pennsylvania Railroad Co. has its own electric plant, but all ferries that are not provided with a plant can obtain power by merely tapping street electric wires. It is said that the cost of operating the electric gypsey does not amount to 10 cents a day.

It is said that with the close of its present fiscal year the American Ship Building Co. (consolidated lake yards) will have a surplus of more than $3,000,000 with no indebtedness of any kind, due to the policy of building up a strong treasury before beginning the payment of dividends on common stock. The company goes on paying 1¾ per cent quarterly on the preferred stock. It would seem that preferred stockholders of this company are even now certain of dividends for two or three years to come, no matter what set-backs might occur in general business conditions. The directors met in Cleveland Wednesday and declared the second quarterly dividend for this year, payable Oct. 15. Books close Oct. 10.

It is reported from Pittsburg that plans for the enlargement of the Homestead armor plate plant of the Carnegie Steel Co. have been prepared and that the erection of the additions will be commenced at an early date. The navy department for some time has requested that better deliveries be made on armor plate, and both the plants of the Bethlehem Steel Co. and the Carnegie Steel Co. will be enlarged to meet the demands. How much the output of the Carnegie plant will be increased has not yet been ascertained, but it is understood that by arrangement a proportionate enlargement will be made of the Bethlehem plant.

FROM LAKE SHIP YARDS.

No orders for new ships have been booked by builders of the great lakes within the past few days, but they are still figuring on a few vessels to be put down during the winter and to come out after the stocks now filled are vacated in the early spring. It is quite probable that the Western Transit Co. of Buffalo will close a contract shortly for a large steel package-freight steamer, probably a duplicate of the vessel now nearing completion at the Union works, Buffalo. This is an order referred to some time ago, but it is now more liable to be placed on account of the loss, a few days ago, of the Western line steamer Hudson. The Ann Arbor Railroad Co. is considering the construction of a car ferry for Lake Michigan service, which will be of about the same dimensions as the vessels which they have been operating for several years past, but of a great deal more power—probably 5,000 H.P. This is an order that will probably not, however, be placed for some time to come, as it is dependent upon certain improvements in Sturgeon Bay canal. It is expected that negotiations for a passenger steamer—quite a large ship for Lake Michigan service—will be closed shortly by the American company.

At Port Huron on Saturday last, the Jenks Ship Building Co. launched a steel freighter that will soon take her place among the big carriers of the lakes. The ship is the Henry Steinbrenner, built for the Kinsman Transit Co. of Cleveland, of which Henry Steinbrenner is general manager, and in which Mrs. Minch, who has other large vessel interests, is a stockholder. The new steamer is 440 ft. over all, 50 ft. beam and 28 ft. depth; is propelled by triple-expansion engines and is in all respects a modern lake freighter. The Jenks Ship Building Co. arranged a luncheon in connection with the launching, and otherwise made the occasion very pleasant for a christening party from Cleveland, which included Mr. Steinbrenner, his son, George Steinbrenner, Miss Jessie Steinbrenner and Miss Carrie M. Lampoh, daughter of Capt. Joseph Lampoh, who is to sail the ship. The vessel was christened by Miss Jessie Steinbrenner. Nov. 1 is the date fixed for her completion. Wm. Miller, who was chief engineer of the steamer Nicholas, will be with Capt. Lampoh in the new ship.

The last of the four large steamers built this season by the American Ship Building Co. for the Peavey Steamship Co. of Duluth, A. B. Wolvin manager, will be launched Saturday at the Chicago works, and will be named F. B. Wells. The F. T. Heffelfinger, launched some time ago at the same yard, will be ready for service before the sister ship slides down the ways. These steamers are duplicates, 450 by 50 by 28½ ft., and are fitted with quadruple-expansion engines and water-tube boilers of Babcock & Wilcox manufacture.

Johnston Bros. of Ferrysburg, Mich., have offered to construct the new Grosse point light-ship, for which Light-House Inspector Wilson of Detroit called for bids a short time ago, at a cost of $14,840. The Jenks Ship Building Co. of Port Huron was the only other bidder, their figure being $15,000 for a 75-ft. boat. The specifications call for a much larger boat.

SHIP BUILDING NOTES.

The torpedo boat Wilkes, building at the works of the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, N. Y., was launched last Saturday. The Wilkes is one of fifteen torpedo boats of similar type contracted for by the government on Aug. 23, 1899. She is 175 ft. over all and 17 ft. beam. She will be driven by two triple-expansion, four-cylinder engines, producing 3,000 H.P., and will have a guaranteed speed of 26½ knots per hour. Her armament will consist of two torpedo tubes and four 6-pounder rapid-fire guns. She is to cost about $150,000.

Roach's Ship Yard, Chester, Pa., is building a steamer for the Ocean Steamship Co. of Savannah, Ga., to be known as the City of Memphis. The steamer will be of the following dimensions: Length, 395 ft.; breadth of beam, 49 ft.; depth of hold, 27 ft. The engines are to be of the inverted, direct-acting, surface-condensing type with cylinders of 28, 46 and 75 in. diameter and stroke of 48 in. Steam is to be supplied by four Scotch boilers, each about 15 ft. in diameter, with a working pressure of 180 lbs. to the square inch.

Hall Bros., Port Blakely, Wash., recently launched the schooner Alpena. The vessel is of the following dimensions: Length, 206 ft.; beam, 40.7 ft.; depth of hold, 16.6 ft. Her gross tonnage is 970 and net tonnage 833, with a carrying capacity of 1,200,000 ft. of lumber. Charles Stimson of the Stimson Mill Co. is managing owner and associated with him are E. E. Caine of Seattle and J. H. Baxter, lumberman and vessel owner, of San Francisco.

The Townsend & Downey Ship Building & Repair Co., Shooter's Island, N. Y., successfully launched recently the steamer Bache, intended for United States coast and geodetic survey work. The vessel is 163 ft. in length, 27 ft. beam and will draw 8 ft. 2 in. water. She will be schooner rigged and will be fitted with triple-expansion engines and Scotch boilers.

The large light-ship which is being built by the Petersburg Iron Works, Petersburg, Va., for the light-house board will be completed by June, 1902. It will cost $80,000 and will be stationed off the coast of Maine. The suction dredge which is also being built by this company for use in Charleston, S. C., harbor is well under way. It will cost $100,000.

F. S. Bowker, Phippsburg, Me., has received a contract to build a 400-ton, three-masted schooner for Capt. Feore, Scranton, Miss. The dimensions are 135 ft. in length, 35 ft. in breadth and 10 ft. in depth. She is intended for the hard pine trade in the gulf.

At Johnston's ship yard, Portland, Ore., two three-masted schooner barges for the Humboldt lumber trade are being built, each being 145 ft. long and 34 ft. wide.

At a meeting of the directors of the Dominion Iron and Steel Co. of Sydney, Cape Breton, Can., held last week, it was decided to pay the first semi-annual dividend of 3½ per cent, payable Oct. 1. It was reported that a third furnace would be placed in operation within a month, and the open-hearth plants will be completed within two months. Every effort will be made to get the entire plant in full operation by the first of the year.

MERCHANT MARINE HOSPITAL SERVICE.

Dr. William T. Jenkins, at present health commissioner of the city of New York, and formerly for a number of years health officer of the port of New York, is at present in England for the purpose of extending to foreign ships the merchant marine hospital service which he had established on similar lines to the United States marine hospital service. The service is at present in successful operation in New York, Boston, Philadelphia, Baltimore, Norfolk, Newport News, Savannah, Brunswick, Charleston, Mobile, New Orleans, Galveston, Pearl River and Pensacola. Dr. Jenkins has the support of a very large number of British owners of the highest class, and of American owners, having ships under foreign flags, and is rapidly securing further contracts. Discussing this subject in London recently he said:

"When I was health officer of the port of New York in 1892, 1893 and 1894 I observed that there was a system of medical crimping going on, that is to say, doctors would go down the bay and meet the captain, and say to him: 'Now, captain, have you had any illness on board or not? If you will let me have your ship for medical attendance while in port we will fix it all right.' The consequence was that such men, while working in collusion with the captain, gave the sailor very little attention; and besides that they charged a fee which amounted to about $25, in addition to extras for prescriptions and hospital attendance, though I should add that system is less prevalent in New York than in other ports. I saw the sailor was not getting proper attention, and I thought there was a good field, so I organized my service, which I call a merchant marine hospital service for foreign seamen. I came over here with influential letters of introduction and conferred with several leading owners, after consulting many medical men in my own country, and they thought it was a good idea. I save owners about 40 per cent., and I secure the sailor the attention he requires, which under the past system he certainly did not get.

"I make a contract to give to the members of the crews of ships while at the different ports medical and surgical treatment, to which quarantine laws do not apply, for $15 for each ship, and this I think prevents any rebate. I have contracted for nearly a thousand ships from that time to this, and the only opposition I have had till now is in the other ports, not New York. The service covers thirteen or fourteen ports on the Atlantic seaboard. For this service I would give medical attendance and visit the ship every day while she was in the port, prescribe for the sailors, and provide them with medicine. If a ship left a sailor in the hospital, then the captain would give a pay order to be paid according to the time the man was in the hospital from date of sailing. It would be my duty to see that he was discharged from hospital as soon as possible. I find that after being appointed some of the captains would disregard the owners' contract and say: 'Well, I could not get the doctor,' and sometimes 'I prefer to have my own doctor.' We have had trouble a number of times with masters, but not as much as I anticipated, for there are many captains who denounce the system of rebates. The point I make in connection with it is that it is a work which gives the sailor attention. A sailor is a carrier of venereal disease, and if he does not get proper attention he goes on and becomes a chronic invalid, and his progeny are probably affected, making unhealthy citizens who frequently become inmates of public institutions. We are trying to obviate that. I should add that 45 or 50 per cent. of the foreign tonnage of the United States goes in and out of the port of New York"

AROUND THE GREAT LAKES.

The new steamer Yosemite of Detroit, M. E. Farr manager, loaded her first cargo at Escanaba, a few days ago—5,657 gross tons of ore.

Superior Steamship Co. is the name selected for the organization that is to own and operate the two steel freight steamers for which Mr. G. A. Tomlinson of Duluth recently placed orders with the American Ship Building Co. and which are to be built at the Superior (Wis.) works.

Hard coal shipments by lake from Buffalo during September were unusually large, aggregating 420,642 tons. Shipments to Oct. 1 are still behind the shipments on the same date in either 1899 or 1900, but the movement during the present month will be large. For the three years the amounts of coal sent up the lakes with the close of September are: 1899, 1,883,710 tons; 1900, 1,421,508; 1901, 1,270,162.

The latest enterprise of F. H. Clergue and his associates at Sault Ste. Marie is the formation of a company to be known as the International Tube Co., to manufacture seamless, lap-welded and butt-welded steel tubes up to a diameter of 10 in. Application has not yet been made for a charter, but the construction of the buildings is being carried on by the Lake Superior Power Co. The buildings will cover an area of about 500 by 1,200 ft. H. G. Waddle of Liverpool, England, will be the manager.

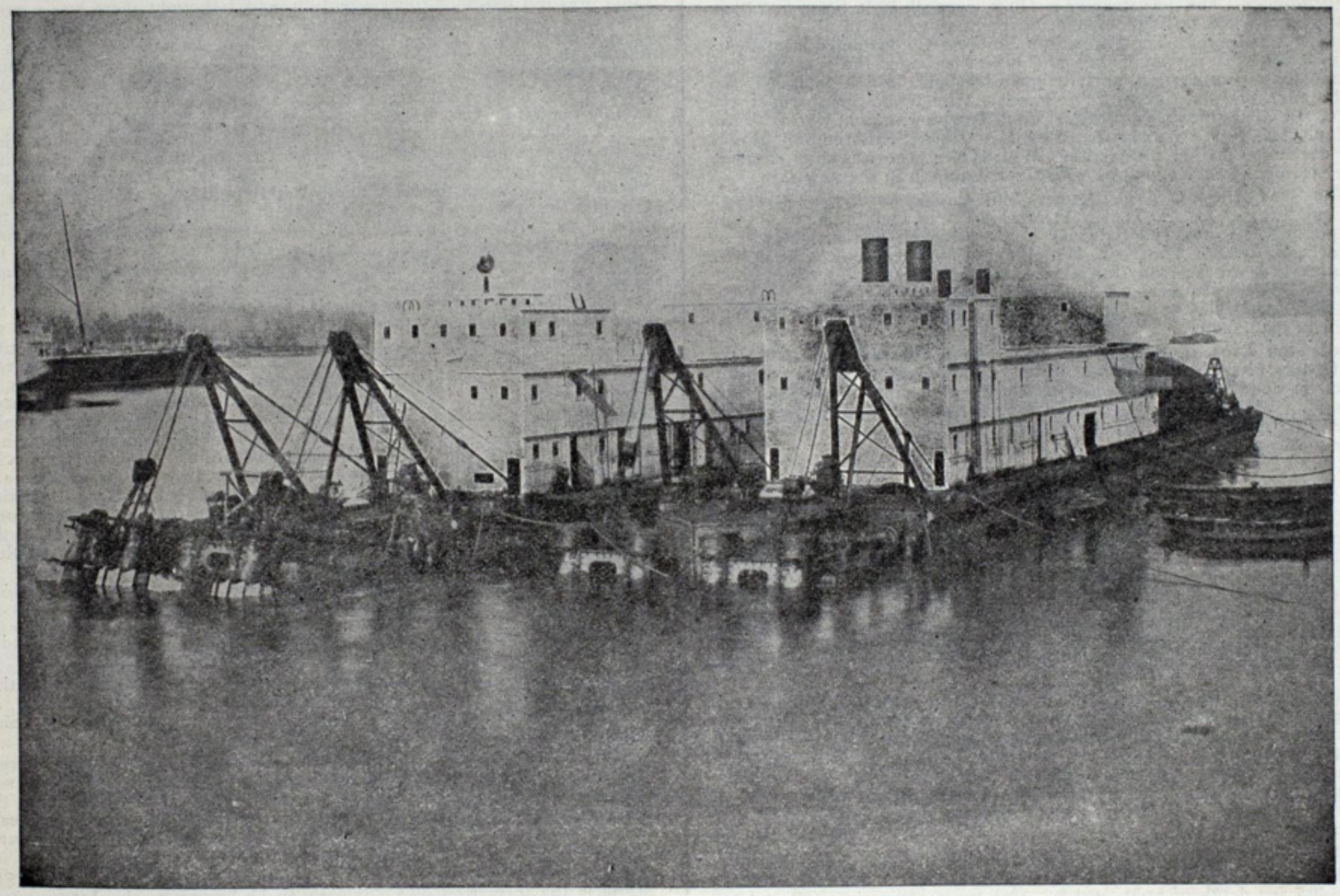
Capt. James H. Rogers, superintendent of the life saving service in the tenth district, died at Detroit, Wednesday, at the age of sixty years after a long illness. Capt. Rogers was born in Maine and enlisted in the Second Maine Infantry when nineteen years old. After serving in all the engagements of the army of the Potomac, he went into the navy, serving there during the latter part of the civil war. He at one time commanded the cruiser Dallas, but was transferred to the lakes to take charge of the revenue cutter Fessenden, later being detached to go into the life saving service.

Advertising matter dealing with the Taylor water-tube boiler, manufactured by the Taylor Water-Tube Boiler Co., Reopelle and Franklin streets, Detroit, Mich., is not elaborate but so much to the point as to invite inquiry. "We call attention," says one of the circulars, "to our short, upright tubes, connected top and bottom, thus allowing the steam and water to separate in the manifolds before entering the drum, and also to the cause of the products of combustion. No possible shut-outs to the stack; all heating surface of equal efficiency. Guaranteed against rupture of tubes. Will not prime in the roughest sea."

A dispatch received at the New York office of the Holland-American line announces the successful launching of the new twin-screw passenger and freight steamship Noordam from the yards of Harland & Wolff, Belfast, Ireland. The Noordam is 575 ft. in length, 62 ft. beam and 44 ft. deep. She is of about 13,000 tons gross register and will ply between New York and Rotterdam.

DREDGERS FOR THE RUSSIAN GOVERNMENT.

A novel feature in the dredgers shown in the accompanying illustration, which have been built by Messrs. La Societe Anonyme John Cockerill of Seraing for the Russian government, is the installation of water-tube boilers. These are of the Babcock & Wilcox marine type and have given on the trials great satisfaction. There are four of these boilers in each hull half, making eight in all, having a total heating surface of 17,200 sq. ft. In addition to this a small boiler of the same construction is fitted in a stern-wheel steamer, which is to act as a workshop and general tender to the dredger. This boiler has 1,000 sq. ft. of heating surface. On the full power trial, with all the machinery running, no trouble was experienced in keeping the water level constant, or in getting a sufficiency of steam, although working at a very high rate of evaporation, which would be, judging from the indicated horse power of the engine, nearly 8 lbs. of water per square foot of heating surface per hour. The boilers are fed exclusively with naphtha. There are four burners fitted to each boiler in the dredger, and two to the boiler in the stern-wheeler. The burners are made so as to swivel out from the furnace when required to be cleaned or examined. The spraying of the petroleum into the furnace is accomplished by a jet of steam. The oil by this means is vaporized and made ready for combustion. The temperature taken of the funnel gases showed these to be very low, not more than 500° F. Any soot which may be formed at any time on the tubes can very readily be removed by means of suitable doors, which are provided in the boiler casing for that purpose; through these doors the whole of the heating surface of the boiler can be scraped or brushed, and as the whole of the interior of the tubes can be cleaned from scale it will be seen that if ordinary care in cleaning is taken the boiler can always be relied upon to produce steam as efficiently after it has worked a long time as when first installed.



DREDGERS FOR THE RUSSIAN GOVERNMENT.

SHIP BUILDING AT PHILADELPHIA.

Philadelphia, Oct. 2, 1901.—Local ship builders are deeply interested in the announced decision of Lloyds Register of British and Foreign Shipping to remove its surveyors at the ports of New York, Baltimore and Philadelphia, their places to be filled by new men sent out from the home office. It has been known for some little time that a move of this kind was pending, but its true significance did not become apparent until a day or so ago. John Haug, Lloyds surveyor at this port, will retire Jan. 1. His successors will be Messrs. McAuslin, Farrar and Minchen, who have already established themselves in this city. Capt. Congdon, holding a similar position in New York, has been retired and it is said that the same will be the fate of Capt. Sanford in Baltimore. Capt. William S. Samuels, Lloyds agent here, said that Llovds Register was dissatisfied with the work of its surveyors, on the ground that the rating of several vessels given by them recently was objected to as being too high by the underwriters. He does not think that the changes insinuate anything against the work done in American ship yards, but rather that Lloyds opine that new surveyors, especially native born Englishmen. will not have patriotic motives to influence them. Mr. Haug is a German by birth, but a naturalized American citizen. He has been Lloyds surveyor here for many years and has rated all of the fine merchant steamships turned out by the Cramps, Harlan & Hollingsworth and the Roach yard in the last decade. The three men who succeed him will have charge of this district, which includes the Delaware river ship yards, and their field may be extended to include Newport News. All of the vessels now building in this locality, including the Kroonland and Finland and a Clyde liner, unnamed, at Cramps; three for the American-Hawaiian Steamship Co. and three for the Atlantic Transport Co., at the New York Shipbuilding Co.'s works, are to be classed by Lloyds.

The last week has been one of unusual activity in shipping circles but in particular in the export petroleum business. This item has for many years been practically the leading shipment from this port, but during the period mentioned a new record was established, which will in all probability stand for many years. In seven days seventeen ships, comprising barks, ships and steamships, weighed anchor on the Delaware for almost every quarter of the globe, their holds filled to overflowing with petroleum or its products. The quantity of crude and refined oil, distilled residuum and naphtha which they carried reached the enormous total of 19,561,964 gallons. Fifteen of the ships are bound for European ports and the balance for Japan. Both the Standard Oil and United States Pipe Line companies predict that this winter will be marked by unusually heavy sailings of this character.

These are busy days also for the local ship yards. The Neafie & Levy Ship & Engine Building Co. reports that the present is the most prosperous season in its history. In addition to the big contracts on hand, including the cruisers Denver and St. Louis and the torpedo boat destroyers Bainbridge, Barry and Chauncey for the United States government, it has contracted to build two tank steamers for the Texas Oil Co., represented by J. M. Guffey, and another for the Weems line of Baltimore. The repair work on hand represented by the large number of tugs and other craft receiving an entire or partial overhauling, gives to this yard an aspect of animation of which its founder would never have dreamed. The Red D liner Caracas received thorough repairs, including boilers, and will return to the South American service practically a new vessel. The fine steam pilot boat Philadelphia is also receiving an overhauling, her place being taken temporarily at the capes of the Delaware by the tug Holton. The tug Crawford is having her boilers examined and tested at Neafie & Levy's this week.

The recently-launched torpedo boat destroyer Bainbridge has been given several trial spins on the Delaware and is now worked down to good bearings all over. She could have gone on her official trial long ago, but as usual there is a delay on the part of the government in sending officers to supervise the trial. President Matthias Seddinger said this week that he hopes to have the acceptance run over by the end of next week, as he is very desirous of putting the Barry and Chauncey overboard. The Denver will be launched early in 1902 and the keel of the St. Louis put down on the blocks vacated.

Eighty-four additional Russian sailors for the battleship Retvizan arrived on the Red Star line steamship Rhynland on Sunday. They were accompanied by three officers and were at once assigned their permanent quarters on the battleship. Oct. 15 has been decided upon for the day when the Retvizan will steam away from Philadelphia for her final speed trial off the Massachusetts coast.

LAUNCH OF THE CRUISER CLEVELAND.

The cruiser Cleveland was launched at the Bath Iron Works, Bath, Me., last Saturday, promptly at noon. On the launching stage were Senators Hanna and Hale, the Hon. Charles Littlefield, Hon. Joseph H. Manley, Gen. Joshua Chamberlain of Portland and Henry G. Morse, president of the New York Ship Building Co. Miss Ruth Hanna christened the vessel successfully, hitting the prow fair with a bottle of champagne as the vessel passed the stage. The Cleveland is one of six sheathed protected cruisers, the construction of which was authorized by an act of congress approved March 3, 1899, the other five being the Denver, Des Moines, Chattanooga, Galveston and Tacoma. The principal dimensions are as follows: Length on water line, 292 ft.; length over all, 308 ft. 9 in.; beam molded, 43 ft. 3½ in.; beam extreme, 44 ft.; freeboard forward, 20 ft.; freeboard aft, 18 ft. 6 in.; freeboard amidships, 15 ft. 6 in.; mean draught in normal condition, 15 ft. 9 in.; corresponding displacement, 3,200 tons; speed required by contract, 16½ knots. A remarkable feature about the vessels of the Cleveland class is the large displacement adopted, the naval board adding about 900 tons to the limit fixed by congress, which has taken them out of the gunboat class and made them full-fledged, seagoing, fighting ships.

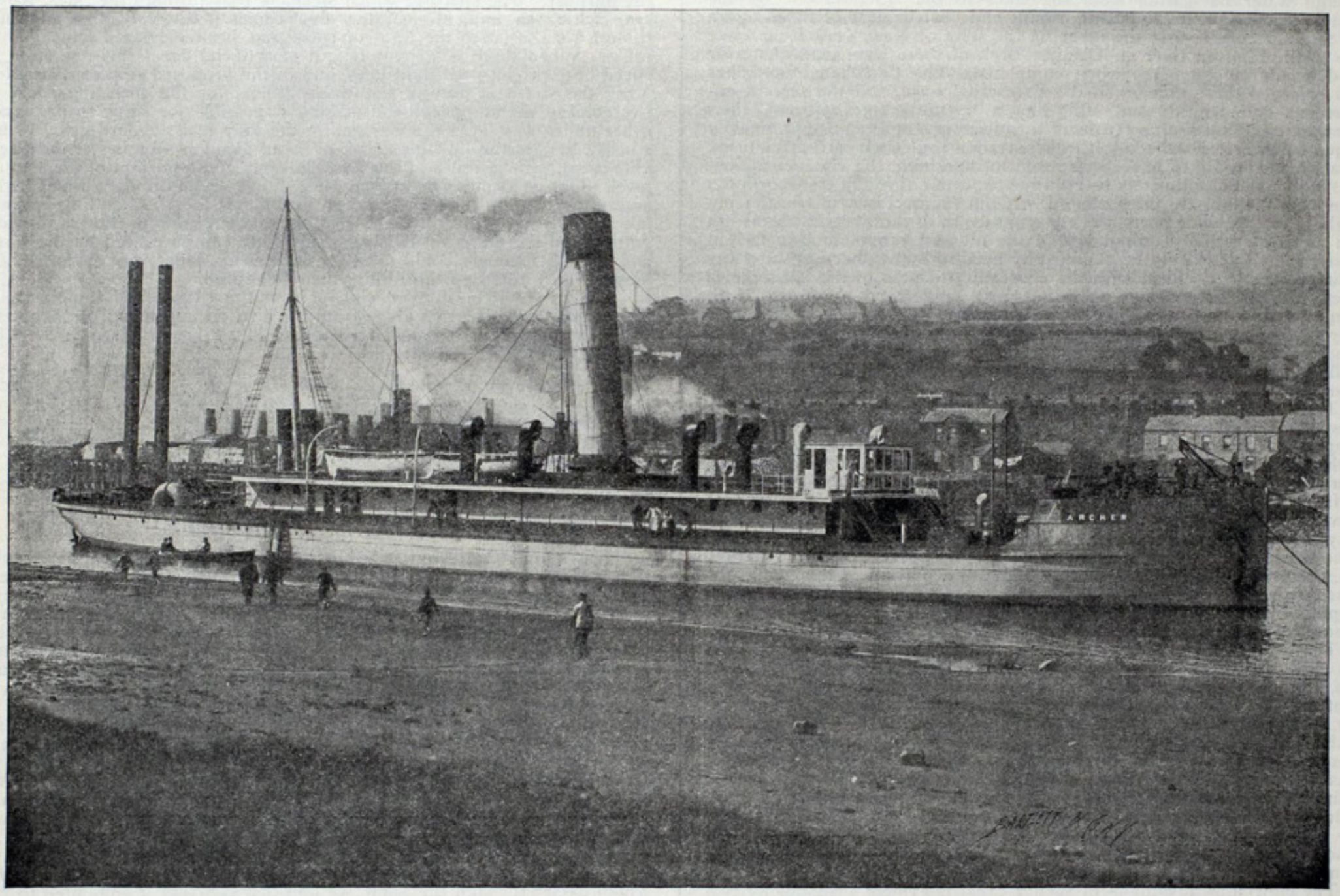
Another important thing in connection with the Cleveland and her five sister ships is the idea of sheathing the bottoms with hard pine covered with copper to prevent the rapid growth of weeds and barnacles which so sadly reduce a vessel's speed, especially in warm waters. For many years Chief Constructor Hichborn stood almost alone in his advocacy of sheathing, but persistent arguments, combined with many object lessons from the reports of our ships in service which confirmed the chief arguments in every particular, have at last overcome the strong prejudice and not only these six cruisers but all of the twelve ships authorized by the last congress, including three first-class armored cruisers, are to be sheathed with copper, just as Constructor Hichborn urged. Her machinery of 4,500 H.P. consists of two four-cylinder, triple-expansion engines with high-pressure cylinders, 18-in. diameter, intermediate 29-in. diameter, and low-pressure 35½-in. diameter, with a common stroke of 30 in.

There are six Babcock & Wilcox water-tube boilers constructed for a working pressure of 275 lbs. per square inch. The total grate surface will be about 300 sq. ft., and the total heating surface about 13,000 sq. ft. There will be two smoke pipes, the top of each being 70 ft. above the grates. The coal capacity of this ship with bunkers full (700 tons) is sufficient to give it a radius of action at full speed of about 2,600 miles. At the most economical rate of steaming, probably in the neighborhood of 10 knots an hour, it will be able to steam about 9,800 miles without recoaling, or more than sufficient to take it from San Francisco to Manila.

The armament will be as follows: Main battery, ten 5-in. rapid-fire guns; auxiliary battery, eight 6-pounder rapid-fire guns, two 1-pounder rapid-fire guns and four Colt's machine guns. The sail area will be about 6,000 sq. ft. The guns will be designed for smokeless powder and the 5-in. guns will be more effective than the old type of 6-in. guns. Eight of them will be mounted on the main deck in recessed ports, the four forward ones having a range from right forward to 60° abaft the beam, and the four after ones from right aft to 60° before the beam. The two remaining 5-in. guns will be mounted behind shields, on the spar deck, one forward and one aft. Four 6-pounders will be mounted on the main deck, and the Colt machine guns on the top of the hammock berthing. The ammunition supply will be large, as it should be, to make rapid-fire guns effective. For each of the 5-in. guns the ship will carry 250 rounds and for each of the 6-pounders 500 rounds.

The wood used in the construction of the hull has been reduced to a minimum. All the bulkheads on the gun and berth decks will be of metal, and the ship will be fitted with a pilot house on the spar deck, built entirely of non-magnetic metal. Where it is necessary to use wood for any purpose, it will be treated with electric fireproofing process before being worked. A watertight deck covered with ½-in. plate will be worked from stem to stern, the sides sloping down to 3 ft. below the water line, and the flat or midship portion rising 18 in. above the same. The Cleveland will have two searchlights, an electric signalling system and a complete installation of electric lights. The blowers for ventilation and deck winches will be operated by electricity amidships. She will carry one 30-ft. steam cutter, one 30-ft. launch, two 28-ft. cutters, one 28-ft. whaleboat gig, one 28-ft. whaleboat and one 18-ft. dingy. The Cleveland is to be fitted with a distilling plant, ice machine and refrigerating rooms. Quarters are provided for the following officers: Commanding officer, twelve ward room officers, ten junior officers, four warrant officers, eight warrant machinists, 238 sailors and twenty-five marines; total, 298.

The contract of the Cleveland was signed Dec. 14, 1899, her keel was laid Friday, June 1, 1900, and she will be the first of the six vessels of her class to be launched. She is the largest government vessel as yet constructed by the Bath Iron Works, although the company is now receiving material for the battleship Georgia, work upon which will soon begin.



Sand-pump dredge Archer, built by Messrs. Sir William G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne, England, for the Queensland government. Fitted with six Babcock & Wilcox boilers with an aggregate heating surface of 44,300 sq. ft. and a grate surface of 1,125 sq. ft.

LARGE ORDER FOR REFRIGERATING MACHINERY.

The Eastern Ship Building Co. of New London, Conn., has placed with the American Linde Refrigeration Co., No. 45 Broadway, New York city, an order for the complete refrigerating machinery for two mammoth Pacific liners building at New London for the Great Northern Steamship Co. The machinery is of the ammonia compressor type, electrically operated, with a capacity of 120 tons per day. There are four large machines operated by 150 H.P. motors. The cargo holds will be cooled by means of air, which is cleansed, purified and cooled by means of spray brine. This scheme has been used with great success on vessels in the Canadian-British trade, and is a slight modification of the very successful scheme that has been used for years in the British-Australian meat trade. All the ships' provision rooms will be cooled by brine pipes, and all the brine pumps, water pumps and air blowers are electrically operated. The machines are located in a separate deck house forward away from all passenger accommodation, and no ammonia is carried below decks.

It is said that the cost of these refrigerating machines is to be about $100,000, and it is understood that the plant will be the finest and most complete, as well as one of the largest, ever installed in any vessel.

GEORGIAN BAY CANAL.

TREATED FROM THE COMMERCIAL STANDPOINT—THE FAR REACHING EFFECTS WHICH WOULD FOLLOW ITS CONSTRUCTION.

The Citizen of Ottawa, Can., recently issued a souvenir edition in honor of the visit of the Duke and Duchess of Cornwall and York, and made its leading feature an article that considered commercially the proposed Montreal, Ottawa and Georgian Bay canal project. The article is quite exhaustive in a commercial sense, and shows both careful research and good reasoning. It is as follows:

From the time of the arrival of the first French explorers on the great lakes in the seventeenth century until the present, the utilization of the great waterways through these lakes as a means for the development of new commerce has been a prominent factor in the commercial and industrial progress of the country. It is only 200 years since the first sail vessel was launched on the upper lakes, during which time the birch bark canoe has been transformed into the steel freight steamship of 8,000 tons capacity, and a freight traffic of 40,000,000 tons annually has been developed from the natural resources of the country tributary to the lake system of waterways.

Two general systems of canals have been constructed to secure through water navigation from the lakes to the Atlantic, one by the Canadian government around the rapids and obstructions of the Niagara and St. Lawrence rivers; the other by the state of New York from Lake Erie to the Hudson river at Albany. Both of these were inadequate for the demands of commerce when completed. The Canadian system has been enlarged three times, and the Erie canal once, and the second enlargement commenced; and still, like a narrow-gauge railroad, their dimensions are not such as to form a satisfactory or even approximately adequate link between the larger transportation routes which they connect. No attempt appears to have been made to determine the channel dimensions which would ultimately be required to form a through transportation route from the lakes to the seaboard, without the necessity of transferring freight at intermediate ports. The present depth of these waterways is not such as to meet the requirements of the modern economic lake freight carrier, and this can only be obtained by making the connecting waterway of dimensions to conform with the controlling depths of the lakes themselves. It has been shown that the most economical ships for 20 ft. draught would have a length of 480 ft. and a breadth of 52 ft. This analysis, therefore, supports the idea that the limit of size of lake boats has been reached unless the channels and the harbors are made deeper. The small freighters of the lakes must go out of business and make way for the more economical type of carriers.

The area of the industrial and agricultural district affected by the transportation system of the great lakes is that stretch of country having its apex at Chicago and St. Louis and stretching back to the west and northwest, and comprising the states of Missouri, Illinois, Kansas, Nebraska, Iowa, Wisconsin, Minnesota, the Dakotas, and the province of Manitoba, Ontario and Canadian northwest. This country has an area of over 2,000,000 square miles. It has a population of ever 21,000,000 and five years ago had only 17,000,000. It is the finest grain-growing country in the world and produced, in 1899, 2,223,000,000 bushels of wheat, barley, oats, corn and rye. It is the export traffic of a portion of this grain, together with the movement of iron ore, that has given the impulse to lake shipping which has brought it to its present magnitude and perfection of economical transportation.

The proposed canal, or rather navigation, goes from Georgian bay into French river, Lake Nipissing and some smaller lakes into the Mattawa, thence into the Ottawa river and so past the Dominion capital to Montreal. Its length is 430 miles. It rises from Lake Huron to Nipissing 60 ft. and falls thence to Montreal 621 ft. It is clear that a canal of a less depth than will allow of the best type of lake freighter to pass from the lakes to the sea would be of little use in influencing traffic. It is proposed to have locks 500 ft. long, 60 ft. wide, and 20 ft. on the sill. They would be single locks, and would be so placed that at some future time they can be duplicated. Such a canal as proposed will take any steamer or barge that can be made to profitably navigate the lakes right down to the seaboard without any transfer or obstruction, there to transfer into ocean steamers.

The enormous advantage of such a canal is evident. Supposing two steamers of the largest class to leave Chicago, they will run together till a little past Sault Ste. Marie or the Strait of Mackinaw. They then part company, one going to Buffalo and the other to Montreal via Georgian bay. The distance between Chicago and Buffalo is 900 miles; between Chicago and French river 475 miles, so that when the one ship arrives at the entrance to navigation the other has still 425 miles to its destination. Allowing for detention at thirty-four locks, we find that the vessel on its way to Montreal will have got to within 50 miles of Ottawa and 170 miles of Montreal when the other has arrived at Buffalo.

This means that for the same expenditure of time and cost required for one ship to reach Buffalo the other will nearly reach Ottawa. Assuming the rate to Buffalo to be 1¼ cents per bushel, the cost to near Ottawa will be 1¼ cents also. For the remaining 170 miles and sixteen locks to reach Montreal, or twenty-four hours, ¼ of a cent will be ample addition. The grain, therefore, can be delivered at Montreal, exclusive of course of any toll, for 1½ cents, and it is not possible to question such a conclusion. From Buffalo to the seaboard at least 3¼ cents have to be added, and therefore grain can be delivered at the seaboard at Montreal for 3 cents less than it can be taken to the Atlantic ports of the United States. That is to say, for one-third the present cost. This, of course, is the immense difference which exists between a transit route and one in which transfer is required. No new ships will be required to obtain the best advantage from this route, but those that will do are already built, or will be in anticipation of its completion.

If a 20-ft. navigation were now made through the Welland and the St. Lawrence, the cost would be not less for it has the same number of locks and 77 miles of canal as against 32 miles on the Ottawa route, and it would still be at a great disadvantage as regards distance and time. From Port Colborne to Montreal the distance is the same as that from the mouth of the French river to Montreal, but of two ships starting from western ports one would be at Montreal before the other was half way through the Welland canal—still 400 miles from its destination. This means loss of time and increase in cost.

Besides this, such a canal as proposed with locks of this size will take any steamer on the ocean except the largest liners. This has reference principally to what are known as "ocean tramps," which have come into being since the opening of the Suez canal, and draw some 24 ft. of water. Such ships are only freighters; their length does not exceed 450 ft. They would lighten at Montreal or Quebec to pass through the canal, and after their trip to lake ports would again fill up at Montreal or Quebec so as to load down to their proper depth for crossing the ocean. This is a very important advantage. First, it prevents the lake tonnage being limited, as should the demands of an unusually large transportation require more tonnage, such would be introduced; and secondly, it would enable the large and valuable lake steamers to be employed outside when the lake navigation is closed, thus releasing an enormous capital, which is now locked up, for profitable use in trading along the Atlantic coast.

The natural advantages of this route are very great when compared with those of similar undertakings. One of the great disadvantages of a canal route is the reduced speed at which steamers have to pass through it. This is necessitated by the wash created by steamers going at great speed, inflicting damage to the artificial banks. The narrowness of the channel also prevents steamers passing each other under way and regulations have to be made by which one or the other stops to let the other go by, and special passing places have in most cases to be constructed for the purpose. The speed at which steamers pass through the Suez, North sea, Baltic sea and Manchester ship canals is about 6 miles an hour, though on the latter the limit of speed has been increased from 6 to 8 miles. When there is a great length of artificial canal this reduction of speed becomes an important item, and in the proposed ship canal to New York the width at bottom was made 215 ft., for the special purpose of overcoming the stoppages and making it possible for ships to pass each other under way. On this navigation the only real standard canal would consist, besides the Lachine canal, of about 24 miles—6 miles at the Grenville canal, with ¾ miles of the Carillon canal and a portion of the summit level. Out of 55 miles of summit level, however, 43 are deep water lakes, and of the 12 miles remaining the greatest single length of cutting between lakes is only 4¼ miles. Besides this, the whole of this portion is in rock-cutting and therefore no damage to the sides can be caused by the wash, and though steamers could not pass each other under way at these short lengths, they could go through at their full speed.

Revenue will be derived chiefly from the export and import trade. The export trade in grain alone from the districts dependent on lake navigation amounted in 1898 and 1899 to the following, as given in the Chicago board of trade report:

Tons.	1898.	1899.
Flour	1,534,994	1,848,569
Wheat	4,941,042	4,225,237
Corn	6,958,160	5,802,966
Oats	1,115,004	490,480
Rye	578,032	338,028
Barley	267,550	53,986
Total tons	15,334,782	12,759,266

It is known that about two-thirds of this total goes from Chicago and lake ports to Atlantic ports chiefly by Buffalo, but a great deal of it by all-rail. And it is also known that a slight reduction in the rate will greatly increase this proportion by drawing away this traffic from gulf ports. Considering the difference at which this traffic can be brought to the seaboard by the Ottawa navigation, we should be able to count on the greater part of the two-thirds, but let us take only one-half. This would amount to from 7,500,000 to 6,500,000 tons, and taking two-thirds of this as moved during the lake season, would give from 5,000,000 to 4,500,000 tons to come in by navigation. That this deduction gives too low an estimate is shown by the 1899 report of the committee on canals of New York state, which shows that the grain and mill products from western lake ports to Lake Erie ports and Montreal amounted to 8,714,390 tons in 1898. Another check can be obtained by taking the grain exported from Buffalo. Last year that amounted to over 120,000,000 bushels, or over 3,500,000 tons, and adding the million that already goes to Montreal, gives a tonnage of 4,500,000 tons in grain alone, besides what goes from Fairport and Erie.

Taking it from another point of view, and considering the traffic which passes through the Sault, we find that last year it amounted to 25,643,000 tons. Of this grain, eastward bound, amounted to 2,560,604 tons, nearly the whole of which would be for export, and is bound to come through the canal. To this has to be added what comes from Chicago and Milwaukee, amounting to 3,500,000 tons, and further, that of other lake ports, such as Milwaukee. It is therefore seen that as a minimum traffic from grain alone cannot be less than 5,000,000 tons, at a low estimate. Copper ores figure for a large amount and probably at the present time 100,000 tons of the same would take the canal. Some iron ores, which bulk over 16,000,000 tons at the Sault, would also pass through the canal. The Spanish ore deposits, with an output of 6,000,000 tons annually, are rapidly being exhausted. With the deepwater access to the ocean the iron ores of Lake Superior will take their place. If this was taken into account by the circuitous route round all the lakes which adds 400 miles and along a canal 685 miles long how much more is it likely to pass through a chord line of a total of 435 miles to the seaboard; and this demand is in the millions!

It is known that a large iron industry is being successfully begun at Sydney. They are able to make basic steel, but for the purpose of making bessemer steel it is said they will require the ores of Lake Superior. Ships taking the ore from Lake Superior will have a return freight of coal and this brings us to another question, the probable traffic in coal. Nova Scotia coal has hitherto not ascended the St. Lawrence to any extent above Montreal, to which point the shipments amount to 700,000 tons. The expense and loss incident to trans-shipment and the competition of American coal have prevented any further extension of the market for Canadian coal in this direction. A glance at the map, however, will show that the Ottawa waterway will give the Canadian coal a great advantage in competing with American coal. All the Lake Huron and Georgian bay ports are closer to Montreal by 400 miles by the Ottawa than by the St. Lawrence. The portion of Ontario stretching all the way from the Quebec boundary to the Manitoba boundary, including the richest mineral dis-

trict of the province, will be served by the canal. Going up the St. Lawrence, Canadian coal directly meets the American competition. Every mile traveled west is a mile into the territory of American coal shippers, but a journey of 400 miles up the Ottawa brings the coal carrier within a few miles of Sudbury, to the edge of possibly the greatest mineral area in eastern Canada, and 200 miles more brings him to the Sault. There is also no reason why grain should not be taken from Fort William to Sydney. It could be stored there and shipped all the year round; would be 1,000 miles closer to Liverpool than it would be at New York, and the vessel could be sure of a return freight of coal.

There are other sources from which traffic is sure to come. The export from the United States in 1899 of beef, hog products, cheese and butter, amounted to 1,574,000 tons, of which the bulk originated at Chicago and the district to the west of the great lakes. This is high-class freight which has to be carefully handled, and there can be no doubt that special steamers would be built for the purposes of this trade, and that the cool, northern route through the Ottawa and the St. Lawrence will be of great advantage. This question of heat is a great drawback to the gulf route, and the coolness of the Ottawa route would greatly help to draw traffic that way. The lumber industry of the Ottawa district represents in pine alone an annual freight of not less than 2,000,000 tons of sawn lumber. Under present conditions all except what is carried through the Ottawa and Champlain canals has to be hauled by rail, the rail charges on lumber from western Ontario to Montreal being heavy. The opening of this waterway would mean cheap transportation and open to the lumber trade of the Ottawa valley the important market of the great lakes region. The importance of that market may be judged from the fact that nine lake ports alone received in 1896 over 2,270,000 tons of sawn lumber.

Cheap transportation will render merchantable from the whole of this district vast quantities of birch, maple, hemlock, tamarac, ash, oak, elm, etc., and rough lumber, which under present conditions cannot be moved, and which will find ready market in the country about and west of the great lakes. The total amount of cordwood transported is nearly one-fourth as great as the freight of all other kinds of lumber together. The output, without any increased cut of pine, will probably not fall short of 5,000,000 tons yearly, the bulk of which will be moved by the navigation. Large quantities of pulpwood are already shipped by rail from Lake Nipissing, and the district is a shipping point for probably 2,000,000 cords of standing spruce suitable for pulpwood. Mills in operation or course of construction at Saulte Ste. Marie and elsewhere have a daily capacity of over 500 tons of pulp, which will before long increase to over 1,000 tons. This is chiefly for export, and the reduction in the cost and possibility of direct shipment will result in an immensely increased production, which in time will reach 1,000,000 tons per annum, and would mostly pass through the canal.

Water Power. It is well known that a large amount of power can be obtained along this waterway. It will have to be harnessed at all the locks for the purpose of working them by electricity. It would then be advantageous so to build the locks and dams as to make it possible to exploit the water power for industrial purposes as well as for the use of the canal. If exploited in a business-like manner the revenue from this source should be considerable; and properly worked, it may be possible, in a few years' time, to get the required revenue from this source alone and thus reduce the toll to a nominal figure.

Looking at the record of traffic at the Sault, we find that the increase of tonnage between 1890 and 1895 was just 100 per cent.; between 1895 and 1900, 70 per cent., and who shall say that in 1905 it will not again be at least 50 per cent. of this enormous total? It is also impossible to make a detailed estimate of the probable traffic. If anybody had made an estimate twenty years ago of the probable traffic of the inter-lake channels he would have either greatly underestimated it or been laughed at as a visionary. The idea that iron ore in any quantity would be transported to Pittsburg from Lake Superior would have been thought utterly ridiculous. We now know from experience on the lakes that a great reduction in the cost of transportation will develop an enormous amount of new business, and that it will deflect from distant and more expensive routes business already existing. The development of new business is a relatively slow process while the deflection of existing business from other means of transportation will take place much more quickly. The experience on the lakes shows two things: First, that the new business developed by the lowering of freight rates is more than half the total; second, that one cannot estimate in detail the new business which will be developed by a great reduction in cost of transportation.

It should be noted, however, that all this applies to low-class freight which cannot bear a high rate for transportation, and which can only be developed by cheap water transport. An increased demand for a higher class of freight will be created by the business which must inevitably follow the construction of great waterway, and will more than compensate the railways for the loss of low-class traffic. High-class freight is package freight, not readily handled by mechanical devices, and therefore not likely to go by water.

With regard to iron. The output of iron ore from Lake Superior was, in 1900, over 19,000,000 tons, and has literally created the enormous shipping and ship building industries of the great lakes, has built up the iron and steel industry of the United States, and has a far-reaching effect upon many branches of manufacture and upon commerce generally. It has created a large export trade from the Pittsburg and Lake Erie district.

The surveys and plans on which the estimates are made, though taken at various times, are both complete and exceedingly well done. An exploration was made by Mr. Walter Shanly, M. Inst. C. E., of the whole route from Georgian bay to Montreal, in 1856. Actual surveys were also made by him from Lake Nipissing to the junction of the Mattawa river with the Ottawa, and also from Fort William, on the Upper Alumette lake, to the head of the Deschenes rapids, near Ottawa. Upon these Mr. Shanly based his report and estimate of 1858. There are also the plans and surveys of the Ottawa river made for the geological survey. The whole length of the waterway has thus been sounded, surveyed and is known. It consists of 367 miles of natural deep-water navigation, that is, below 22 ft.; and the heavy work is confined to two sections. One is the summit level, a distance of 25 miles; the other the Ottawa river channel, along the Alumette and Calumette islands, a distance of about 30 miles. Mr. T. C. Clarke, M. Inst. C. E., made surveys for all the lock sites, from the Georgian bay to Ste. Anne, as well as of the reaches from the mouth of the Mattawa river to Chats river. His report and estimate are based upon these surveys, and information obtained from the geological survey's plans and report, and he proposes fifty locks. Mr. E. P. Bender, M. Inst. C. E., made a survey and reported upon the portion of the route from Georgian bay to Lake Nipissing in 1870, with plans of the river stretches and lock sites.

In 1899 a survey was made by Mr. Henry Macleod, M. Inst. C. E., with much care of the summit section, from Lake Nipissing to Talon lake, on the Upper Mattawa river, and borings were made throughout to ascertain the nature of the material to be excavated. In 1900 Mr. Macleod made an approximate estimate of the cost of the whole line, from Georgian bay to Lake St. Louis, making the navigation 14 ft. on the lock sills and 16 ft. in the open reaches, with locks 250 ft. by 45 ft. This estimate was based upon Mr. Clarke's report and plans. The level of the water stretches was very little changed, but the locks were set lower, and the prism of the canal deepened. In 1899-1900 Mr. Macleod made surveys and estimates for the department of railways and canals, from Deschenes lake to Ste. Anne, including the locks at Deschenes and Chaudiere Falls at Ottawa, but omitting the Grenville to Carillon canal, of which the department of railways and canals possesses all the necessary information.

In the autumn of 1900 Mr. Macleod commenced surveys of the Rocher Fendu channel, and the Calumette channel, on each side of the Alumette island. This comprises the most difficult portion of the Ottawa river, and it was made for the purpose of ascertaining which channel is best and most economical. Plans and estimates of this portion have lately been completed. These are profiles and cross sections of the lock sites, as made by Mr. Clarke, also plans and most of the profiles of all the reaches made by Messrs. Clarke, Shanly, Bender and Macleod. Also Bender's plans of the lock sites and river stretches of French river from Georgian bay to Lake Nipissing. All Mr. Macleod's surveys agree very closely with those made in former years. Now comes the all-important question, "Will it pay?" The minimum tonnage reasonably estimated is 7,000,000 tons. The saving over the present transport cost from lake ports to the seaboard at Montreal we found to be 3 cents a bushel, or $1 per ton. There is no necessity, and it is not proposed, to give the whole of this large saving to the trade. To begin with, it is proposed to share it, and later on, when the tonnage is greater, to gradually reduce the tolls. Besides the reduction of 1½ cents, or one-third the present minimum rate, the trade obtains the enormous advantages of time and transit without transfer. It should here be noted that a reduction of ⅛ cent per bushel begins to draw traffic, and ¼ cent decisively so, and that we have six-quarters to the good. There is therefore a toll of 1½ cents per bushel, or 50 cents per ton. This is no doubt very moderate and compares well with 7s. 6d. per ton levied on the tonnage passing through the Suez canal. This tonnage is estimated for traffic in one direction. There will be an equal tonnage of ships in the opposite direction, though they will not be fully loaded. It will be a matter of detail as to whether this toll should be levied in one direction only when it would be 50 cents and the vessel allowed to return free of toll, or charged both ways when it would be 25 cents. No doubt sea-going steamers coming through to the lakes and going out again would be charged tolls both ways at 50 cents. But for the purposes of calculation it is better to confine ourselves to the 7,000,000 tons and to a toll on the same of 50 cents. This gives us a revenue of $3,500,000.

A deep-water outlet from the lakes is almost certain to be built on some route in the near future. With the fact definitely established that a waterway of proper dimensions was sure of construction within reasonable time by the Georgian Bay-Ottawa route it unquestionably would not pay to build a second canal on any other route. It is therefore good policy to settle on what is to be done at as early a date as possible. If this ship navigation is constructed the results will be far reaching. No other canal will be or ever can be constructed from the lakes to New York. The cost of over $200,000,000, which is by some considered prohibitive now, would become absolutely so because it would be unnecessary, and though it might be shown to give a return now without any other ship canal to compete, the long loop canal would have no chance of competing against the short chord. The Ottawa navigation would be in working order five years before the other could be completed if commenced at the same time. From the foregoing facts the following conclusions are inevitable:

First—That the great need of the enormus and rapidly increasing lake traffic is an outlet for lake freighters to the seaboard.

Second—That such an outlet can be given by a 20-ft. navigation only.

Third—That the chain of rivers and lakes from Georgian bay to Montreal is the natural waterway designed by nature to attain this purpose and by which Manitoba and the Canadian Northwest will be brought into direct, cheap, water communication with the seaboard.

Fourth—That it is the shortest outlet by over 400 miles for the western lake ports, and can be constructed at a cost of less than a third of any ship canal from the lakes to the United States seaboard.

Fifth—That when constructed it will revolutionize the trade of the great lakes, diverting it to the ocean through the St. Lawrence to the benefit of the whole Dominion and specially of the ports of Montreal and Quebec and the maritime provinces.

Sixth—That such a waterway with its water powers would open up to settlements and centers of industry the provinces of Ontario and Quebec along the Ottawa valley and French river.

Seventh—That the opportune moment for entering upon and carrying to a speedy completion this important undertaking has arrived and deserves the material and energetic support of the Dominion government.

At a special meeting of directors of the Champion Rivet Co. on Saturday last, Mr. William C. Winterhalter of Pittsburg was elected secretary and Mr. Henry Chisholm, treasurer. Mr. Winterhalter was connected with the Riter-Conley Mfg. Co. of Pittsburg for fourteen years as assistant to the general manager. He will now take charge of the business of the Champion company at Pittsburg where the company is building the most modern rivet factory in the world. Mr. Henry Chisholm is a son of the president, Mr. Wilson B. Chisholm, formerly vice-president and general manager of the Cleveland Rolling Mill Co. Young Mr. Chisholm is a graduate of Yale, class 1901. In addition to his position as vice-president, Mr. D. J. Champion was elected general manager.

A new chart, in colors, of Erie harbor and Presque Isle, has just been issued and may be had from the Marine Review. A new chart of Buffalo harbor and Niagara river to the falls is also in print.

ECONOMY IN MANUFACTURING.

SOME FACTORS AFFECTING THE ECONOMICAL MANUFACTURE OF MARINE ENGINES—VALUE OF THE PREMIUM SYSTEM

Among the interesting papers read at the International Engineering Congress at Glasgow was one by Mr. William Thomson of Glasgow upon the "Manufacture of Marine Engines." The paper was really upon some factors affecting the economical manufacture of marine engines. He said that of late years a great and increasing interest had been taken in the internal economy of engineering workshops. Manufacturers are becoming alive to the fact that it is necessary that a closer and more personal interest be taken in the most trivial details of workshop practice. They are forced to consider certain influences, some of which have been looked upon as outside the range of practical workshop economics, or at most have received a qualified or indifferent approval. The points particularly referred to are: A premium system of labor remuneration; good, accurate and powerful tools; arrangement of tools and roomy shops; clean and tidy shops; well-lighted and well-warmed shops; standardization. Mr. Thomson said:

"The first and greatest of these influences is the introduction of the premium system, which effects nothing short of a complete revolution in the shop; and its consequences are very wide and far-reaching indeed, and in directions which, at first sight, might seem to have no connection with the source. One of the primary results of the premium system is the establishment of accurate data upon which comparison can be based and deductions made. It is hardly possible to overestimate the benefits of having accurate and reliable detailed data in the works as a means of comparison; yet this is so often overlooked or ignored, and the comparatively small sum per annum which the establishment of an efficient time or records office in the works would cost, is grudged because the profitable return which such an investment would give, if properly worked and managed, is not realized. The revelations which would be made by the introduction of such an office in any place previously without one would be sufficiently convincing to most engine builders. The accompanying table (I) gives a few examples of what the premium system has done in the way of economizing time. Another most important factor in the economical production of work is good, powerful, and very especially accurate machine tools. This is axiomatic.

"The premium system had not been very long started before it began to show up some very great discrepancies in the performance of similar tools when on the same work. This led to an investigation of the causes and generally it was found that the result was due to weakness or want of power in the less efficient tool. Indeed, so frequently was this particular fault of weakness or want of power found to exist that the limit of output was very soon reached; and in order to overcome this, all the work had to be moved up a stage or two, and a heavier class of tool used, in order to get more power for the heavy cutting which the premium system developed. This led to congestion in the work for the heavier tools, so newer and more powerful ones all along the line were substituted as soon as possible. A few examples of the results of this substitution are given in table I. The high-cutting speeds which have been introduced since the Bethlehem company raised the question have very much increased the

TABLE I.

Description of work.	Same machines throughout.			
	(1) Time taken under old time system.	(2) Time taken on introduction of premium system.	(3) Time taken in better location with greater facilities.	(4) Record time for the same job.
	Hours.	Hours.	Hours.	Hours.
1. Turning connecting rod. 1 off.....	43½	36	35	29¼
2. Slotting connecting rod. 3 off.....	31	24½	22¼	20
3. Crank web (finishing holes. 1 off).	7⅔	5¼	4¾	3½
	Old machines under		New and more powerful machines on premium system.	
	Old time system.	Premium system.	First time on new machine.	Record time.
	Hours.	Hours.	Hours.	Hours.
4. Turning tunnel shafting. 1 off.....	42	29¾	23½	21
5. Turning ecc. rods. 1 off.....	22	11½	9	8¼
6. Turning thrust shaft. 1 off.....	129	97¼	75	65
7. Finish turning crankshaft. 1 off...	42	34	15	9¾
8. Turning quad. blocks. 13 off.....	195	140	91¼	—
9. Slotting sole-plates. 1 off.....	70	59¼	41½	35¼
10. Slotting condenser. 1 off.....	64	56	44	34
11. Slotting high-press. cylinder. 1 off	45¾	33¾	24	21
12. Ripping out holes in crank webs (1 web). 2 holes.....	29	17	9	7
14. Hole boring main bearing covers for bolts. 12 holes.....	45	37	27¼	20
15. Planing six steel slabs for 12 crank webs	142½	102	65½	—

stress on lathes and boring machines, and have rendered powerful and substantial machines a greater necessity than ever. Generally speaking in machines of this class cutting power is not in proportion to capacity, and want of belt power is a fault more often met with than not in machines of all classes. A certain tool made by a first-class firm was purchased by the author's firm three years ago, and after repeated trials it was concluded that it had not adequate belt power; so when a second machine was ordered, an increase in the ratio of gearing of about 28 to 30 per cent. was insisted upon, much against the will of the toolmakers, who considered that the first machine was amply powerful. The result is that the newer machine turns out the same work as the old in 26.5 per cent less time.

"The questions of arrangement of tools and roomy shops are closely connected and interdependent, and where these have to be applied to existing buildings they become very difficult ones to settle, and in most cases the result cannot be anything more than a compromise, because, for a given sequence of operations to be carried on within a given crane area, certain tools are required, and roominess around each tool cannot be given without affecting the arrangement of the tools, probably to the extent of excluding some of them altogether from the building, and thus breaking the sequence of operations by extra handling. When, however, new shops or extensive alterations are about to be entered upon, the question deserves the most serious consideration. The comfort and convenience of having roomy machine shops is another condition very difficult to put a money value upon; but those who have had to deal with overcrowded machine shops, where a large proportion of floor space is taken up by tools or by the work for them, realize the great inconvenience and discomfort caused by this, and must see that money is being lost under such an arrangement. Plenty of room should be allowed round each tool; and this applies to a greater degree to heavy machine tools than to light, because these have to deal with much heavier and more bulky pieces which cannot be easily handled or transported from spot to spot, and are generally stacked around or near the machines which operate on them.

"The question of handling of material, which is the direct result of the arrangement of tools, is one which has not received the attention it deserves, simply on account of the difficulty of getting at the direct loss caused by a poor arrangement, even if it is realized that a loss is taking place, and experiments are tedious and expensive. There is no doubt, however, that much can be done in this direction in the marine engine shop if these questions be properly investigated. As an example of what can be done by the consideration of these questions, it might be mentioned that after the author's firm laid down their new boiler shop, the work turned out by the light and heavy plating squads was done in 19.6 per cent. less time in the new shops than it had averaged in the old, while the machines turned out their work in 10 per cent. less time than before; the conditions in both cases as regards tools and appliances being exactly the same, except that more room was allowed. Another example taken from the machine shop illustrates this same point very well. A group of three machines was located in the old machine shop in somewhat cramped and inconvenient positions, but afterwards these machines were shifted to a new machine shop, and given ample room. The results of this new arrangement are given below in the Table II.

TABLE II.

Machine.	Saving. Time. Per cent.	Saving. Money. Per cent.	Output increased by Per cent.
Double-headed horizontal borer.....	3.9	2.5	4
H. & V. planer	22.5	14.0	29
Connecting rod lathe	12.8	8.3	14.7

"In this comparison the conditions were as nearly as possible the same in both cases; the machines doing the same kind of work, the same men were at the machines, and were working under the premium system in the new shop as in the old. The result was that the men made on an average—which is taken over a long period in both cases—9.3 per cent. more wages, the work was 8.3 per cent. cheaper to the firm, and 15.9 per cent. more work was got out of the same machines, due entirely to a better arrangement and more roomy location of these machines. This example is only one of many which could be given, but serves to bring out the points which have been mentioned.

"With regard to clean and tidy shops, it is the belief of the author's firm—and they are encouraged in this by experience and example of the most progressive shops—that these do pay; yet are not dirty, dark, untidy, cold, and badly arranged shops met with in this and other countries, turning out good work, which must cost, and is costing, more than it might, simply on account of these drawbacks. That such conditions are allowed to continue is due either to indifference or ignorance of better on the part of the responsible management; or if they realize the benefits of having better conditions, they lack the necessary courage or perseverance to put an end to the old bad ones. The value of having clean, tidy, well-lighted, and warmed workshops is one which is impossible to determine in £ s. d., but that it does have an actual and very real and substantial value is the belief and experience of all those who have embodied these conditions in their workshop practice, and there are now many examples of this belief.

"One cannot have a clean shop which is not a tidy shop, and neither will be found in a badly-lighted shop. The author's firm set out to improve on these lines by first getting rid of the old earthen floor which is so common, and by laying the whole of the ground floor with granolithic and concrete pavement. The improvement is most marked. Formerly with the old earthen and iron-chip floor it was impossible to keep anything clean. Dirt and dust was the order of the day if the floor had to be swept, so it was generally left alone as long as it could be tolerated. Now there is no trouble, but instead a fine, smooth, clean, bright surface to move about on. The floor is from 9 to 12 in. thick in most places, and below machines somewhat thicker, and consists of about 2 in. of rough bottoming of broken stone, then 6 in. of concrete of 5 to 1, and a top finish 2 in. thick of facing made of granite chips and cement in the proportion of 1½ to 1. As it sets it is levelled and smoothed off with a trowel, and in three days is ready for use, becoming quite hard in about a week, and when thoroughly set the floor assumes a beautiful white surface, which has the effect of reflecting the light and perceptibly aiding the general lighting of the shop. Although somewhat dearer than other styles of flooring, there is none other which possesses so many advantages. It has a fine bright, smooth surface, and is therefore easily swept and kept clean; is easily repaired, and does not wear into hollows like wood paving; and there has been no complaint from the workmen about it being sore to the feet.

"The benefits of having a well-lighted engine and boiler shop are pretty generally recognized, but not to the extent they might be. There are still far too many places—some of them of front rank—without adequate means of lighting, struggling along with lucigen lamps or gas in an almost Stygian darkness, which can only be dispelled by electric light and plenty of it. This is more generally the case in boiler shops than in machine shops; and, if there is a place where there ought to be good light

it is in a boiler shop. The amount of time lost by men cautiously feeling their way about in semi-darkness, coupled with the time lost by skulkers and loafers dawdling away their time in dark corners, is very considerable; besides which, men very naturally dislike having to work in a dark shop, and their unwillingness affects their attendance and they lose time.

"Owing to certain circumstances, the new boiler shop electric light installation was not in working order until the winter season was half through, yet from the day the current was switched on the boilermakers' attendance improved; and while the average time lost before the introduction of electric lighting was 14.72 per cent., after the light was introduced the time lost averaged 13.2 per cent.; a distinct saving of over 1.5 per cent., or three-quarters of an hour per week per man. This is attributed solely to the lighting of the shop. The difference in other directions is most marked. The men can move about with freedom and decision, there are no dark corners, the time-workers have not the same temptation to waste their time, and managers and foremen can see what is going on from end to end of the shop with the utmost distinctness. Table III. (subjoined) gives a comparative statement of the various shop lighting.

"With regard to the warming, this a problem which has given the firm much thought for some time back, but as yet no definite decision has been come to in the matter. The range of temperature is not nearly so great in this country as in the United States and Germany, and the want of proper heating facilities does not become one of daily experience; hence probably the reason why so little has been done in this direction. Nevertheless, there cannot be any doubt that as a rule engineering workshops in this country fall very short in this direction. The idea which used to be very prevalent, especially in boilermaking lines, that a cold snap made men work all the harder in order to keep themselves warm, is happily exploded, and a more rational view is now being taken of this hitherto much-neglected subject. How is it to be expected that work, and especially good work, is to be got from men whose hands are chilled to the bone, and while the main energies are naturally taken up with means of keeping up their circulation.

TABLE III.

Shop.	Area.	Lights.	Amount of floor space per ampere.
	Sq. yds.	Amperes per pair.	Sq. yds.
Boiler shop	3700	22 at 10 4 at 15	13.2
Heavy machine shop C. I. bay	880	12 at 10	7.3
Light machine shop C. I. bay	83.5	11 at 10	7.6
Erecting shop	1040	11 at 10	9.4
Heavy machine shop M. I. bay	1430	12 at 10	11.9
Heavy machine shop M. I. bay gallery (screwing gallery)	479	4 at 10	11.9
Finishing shop	574	12 at 10 (inverted)	4.8
Smithy	511	4 at 10 (inverted)	12.7

Voltage 110. Brokie-Pell lamps.

"The premium system, with its attendant records, very soon showed up the benefits of having duplicate work, as the saving of time was quite considerable where a run of duplicate or nearly similar pieces was given to a machinist. This was so marked that the question of standardizing, not only the details, but the whole engine, was gone into in order to get the full benefit of this; and as patterns began to require renewal the engine was re-designed with this end in view. In carrying out this idea in a new design it was found necessary, not only to consider the engine and its details in relation to themselves alone, but also with special regard to their position in the range of sizes which it was decided to make with a view of keeping down the number of different sizes of details. The question instantly became one not only affecting the whole range of engines made by the firm, but also their practice in connection therewith. This practically meant re-designing simultaneously all the sizes of engines made; but a careful analysis and consideration of the requirements to be met enabled the whole range to be suitably broken up into well-defined groups, each group representing a certain size of main centers, and permitting certain variations of cylinder diameter and stroke within well-defined limits, and suitable for the usual steam pressures. The details—which in each group are never altered, although the cylinders may vary within the group limits—are in very many cases common to several groups, and a large number common to the whole range. This object is always kept in view, in order to provide as much duplicate work as possible. Especially is this so in the case of the very small and numerous details, because in these the governing factor in the cost is the wages, not the material; a slight and unimportant variation in size causing a relatively large variation in wages cost; while in the larger details the conditions are reversed, and the material becomes the important cost factor, a relatively small variation in wages covering a very large variation in size. The location of the dividing line between these two conflicting sets of conditions thus becomes a matter of considerable importance, but the accurate data from the time office enables its position to be fixed with great exactness, so as to allow of as much duplication of parts as will pay.

"When, however, duplication of pieces can no longer be carried out on account of the cost of material prohibiting it, much can be done in the way of duplicating similar machined, faced, etc., parts in different groups. This enables and encourages the use of jigs, which, under other conditions, would not have been warranted by the saving in wages. When even this cannot be done, standardization by a graded series of similar pieces does much to make the progress of the work through the drawing office and the shops easy and free from the friction and delay incidental to sudden and abrupt changes in design. In the drawing office it has the effect of crystallizing that vague thing known as 'our practice,' and compels it to carry out its work on well-defined lines, thus avoiding expensive and irritating changes and mistakes or oversight. It has also the effect of economizing draughtsmen's time, as a standard series of drawings once properly arranged do not require to be re-drawn for every new job. In the shops, standardization by its consistency in design familiarizes the staff and men with the practice and enables them to go about each new job with confidence and expedition; knowing that each job as it comes forward, if not a duplicate, will at least be similar; all of which go far to speed up the progress of work through the shop and thus increase the output. And, above all, by the very fact that the means to effect this calls for the best facilities and most exact workmanship, the result is that the character of the workmanship is raised besides being cheapened, with satisfactory results to both consumer and manufacturer."

GRAPHIC ANALYSES OF PROPELLER REACTIONS.*

BY MR. J. MELLEN ADAM.

PART I.

An endeavor is made in this paper to concentrate attention on the propeller and the fluid which passes through it as a conservative system. Although apparently an elementary inquiry, it may be useful to examine, and, if possible, to define the reactions produced in a fluid by a rotating screw. The difference between the screw pitch and the resultant ship speed provides the angle of incidence without which no energy would be usefully expended.

This angle of incidence is immediately taken by the leading edge of the blade with a certain shock, and a reduced pressure of the reverse, which at high speeds results in tip cavitation, a phenomenon apparently similar to vena contracta. Attempts to adopt gaining pitches have not been successful, probably because the radial component is increased thereby, and also because an acceleration uniform from tip to boss is not possible in a helical vane in which, by construction, the tip subtends a much smaller angle of rotation than the root.

A feature of the helical screw, therefore, is its essentially non-gaining pitch, and this latter element is necessary for high efficiency. When waves roll on shelving rocks at low angles, they immediately break in impotent foam; but in several places on our coasts, owing to a different formation of rock, the water under similar impulse is deflected upwards in an unbroken column 30 ft. or 40 ft. high, and a little consideration will lead us to deduce the form of surface most favorable to the latter result.

A particle escaping from the impact of a narrow inclined plane—moving uniformly in a straight line at right angles to its length—will move according to Newton's second law in a straight line, and the direction will be determined by the angle of incidence at first contact, and will indicate the resultant direction of the oblique force. This resultant may, firstly, be resolved into two component forces: A, at right angles to the path of the vane representing the deflection of the particle, or work done; and B, parallel to the path, representing the inertia of the mass, or what has been erroneously called useless resistance. If, now, we take account of the length of the plane, we form a conception of two sheets of force, A and B, characterized as above.

Let the inclined plane be pivoted at one end and the free end moved through an arc, then the component sheets become A, parallel with the axis, or for our present purpose, effective; and B, at right angles thereto, tangential to the arc—but in this case tangential only for an infinitesimal instant of time, and with varying magnitude falling to nil at the axis, and each particle in reaction still retains its direction in a straight line. Let the plane or vane be twisted to co-relate the angle of incidence to the radius,then the force becomes extra tangential, because every arc is bounded on its outer edge by an arc whose angle of incidence is somewhat less steep. Remembering that to compel a mass to describe a curved path, it must be acted on by a force directed towards the center of curvature, the helical screw possesses no restraining element opposing tangential and therefore centrifugal escape of energy, but adds a material inducement thereto.

Let us consider a rotating disc to consist of a sheet of radii, and a uniform system of tangents to be superposed on the same plane and extended to infinity. Then, as a component, B may be characterized as a plane of forces perpendicular to A, but with a definite direction equivalent to the converse of a couple. B may now be compared to the case of uniform motion in a circle. For this purpose let two components of resistance to the force B be c circumferential, and d at right angles thereto or diametrical. If d, acting along the radius, be directed outwards from the center, the stress would fall within the circumference of the disc and correspond to a moving force directed toward the center of the circle, altering the direction but not the magnitude of the velocity, and therefore absorbing no power.

But we have seen that the resultant direction of displacement by the angle of incidence of the helical screw is extra tangential; d, therefore, as a component resistance acting along the radius, is directed inwards toward the center, and the reaction falling without the circle is occluded from c. The value of c, therefore, as a resistance appears to be diminished by the recession of the tangent through each quadrant of rotation with a definite loss of pressure.

PART II.

Let an immersed hollow cone be rotated in its axis; it is obvious no energy will be expended beyond overcoming skin friction. Let the cone be divided and its axis inclined on the plane of division to the axis of rotation (these axes intersecting at the apex); let the apogee be the leading edge, and a reactive surface will emerge having several peculiar features. Obviously also the greater the inclination, as the perigee approaches the "shaft axis" the more pronounced will be the reactive surface; or, in other words, the greater will be the potential pitch ratio, yet the apogee edge will continue nil pitch through every phase, having a tangent which is common to an arc of gyration.

The pitch lines of a rotating half-cone correspond to the figure of cylinders concentric to its shaft axis intersecting the conic surface, and on development are seen to be symmetrical curves of increasing pitch from zero to apogee, with equal acceleration, and therefore equal pressure over the whole surface. Every pitch line so defined is identical in form, differing only in scale of magnitude, and perfectly co-related to the radius, and all contiguous lines produced by a rotary movement are therefore identical in direction, so that the resulting current is homogeneous over the whole surface.

A remarkable feature of these lines—distinguishing them from those of a helical screw—is that every arc is bounded by an arc whose angle of incidence is much more steep; so that the theoretical or cylindrical stream line is also the path of least resistance to a fluid escaping from the impact of this surface. The required vane will be found on this surface, and its position will be rigidly determined by the respective pitches required for the leading and following edges.

*Abstract of paper read before International Engineering Congress, Glasgow.

RECORD OF IMPORTS AND EXPORTS.

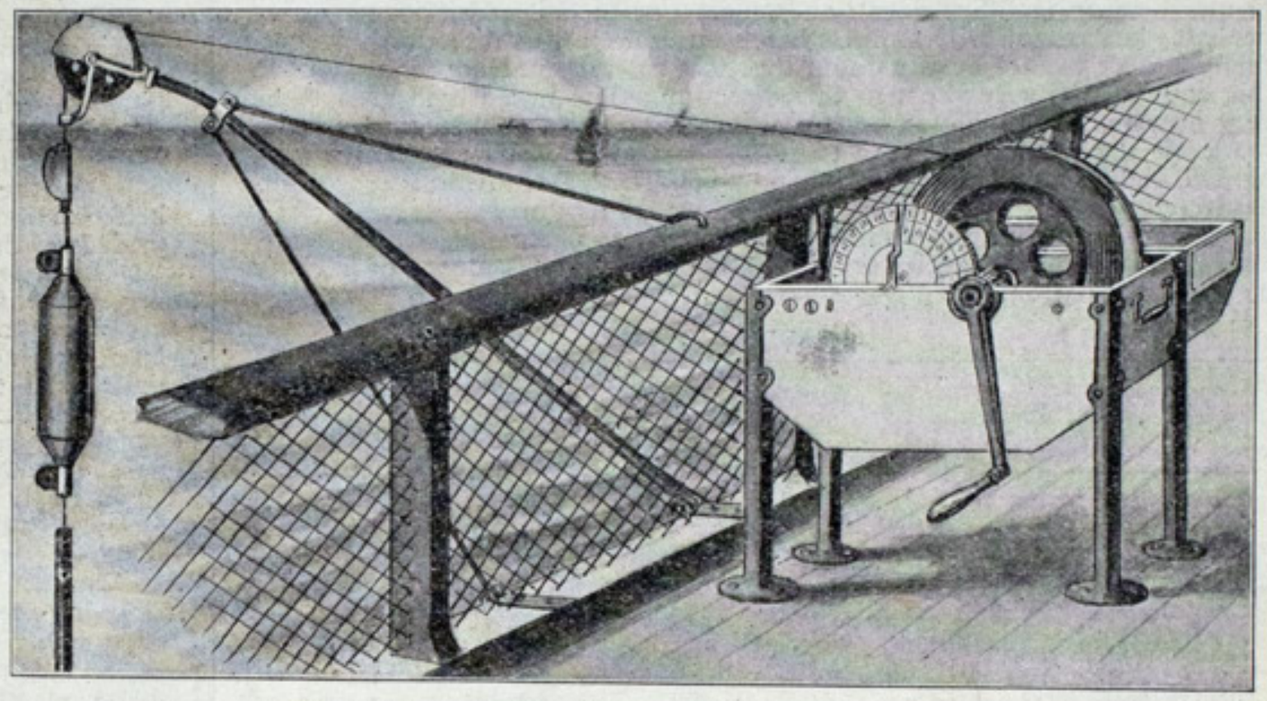
BOTH ITEMS AGAIN SHOW A MARKED GROWTH IN FOREIGN BUSINESS—SUBSTANTIAL INCREASE OVER THE FIGURES OF 1900.

The record of the foreign commerce of the United States during the eight months ending with August, 1901, shows an increase in imports of $14,000,000 and an increase in exports of $23,000,000, comparing the eight months of the calendar year 1901 with the corresponding eight months of 1900. The increase in imports is chiefly in coffee and diamonds. Coffee increased from $37,245,286 in the eight months of 1900 to $45,151,041 in the eight months of 1901, an increase of $7,905,755. Diamonds and other precious stones increased from $8,597,200 in the first eight months of 1900 to $17,198,670 in the same months of 1900, an increase of $8,601,470. Thus the total increase in imports is found in the two articles, coffee and diamonds. In manufacturers' materials and manufactures ready for consumption the figures of 1901 are strikingly similar to those of 1900. Articles in a crude condition for use in manufacturing were in the eight months of 1901 $198,702,596, against $198,961,392 in the same months of 1900; articles wholly or partially manufactured, for use in manufacturing, were in the eight months of 1901, $54,795,758, against $55,994,569 in the same months of 1900; and manufactures ready for consumption were in the eight months of 1901, $89,850,126, against $89,815,604 in the corresponding months of last year.

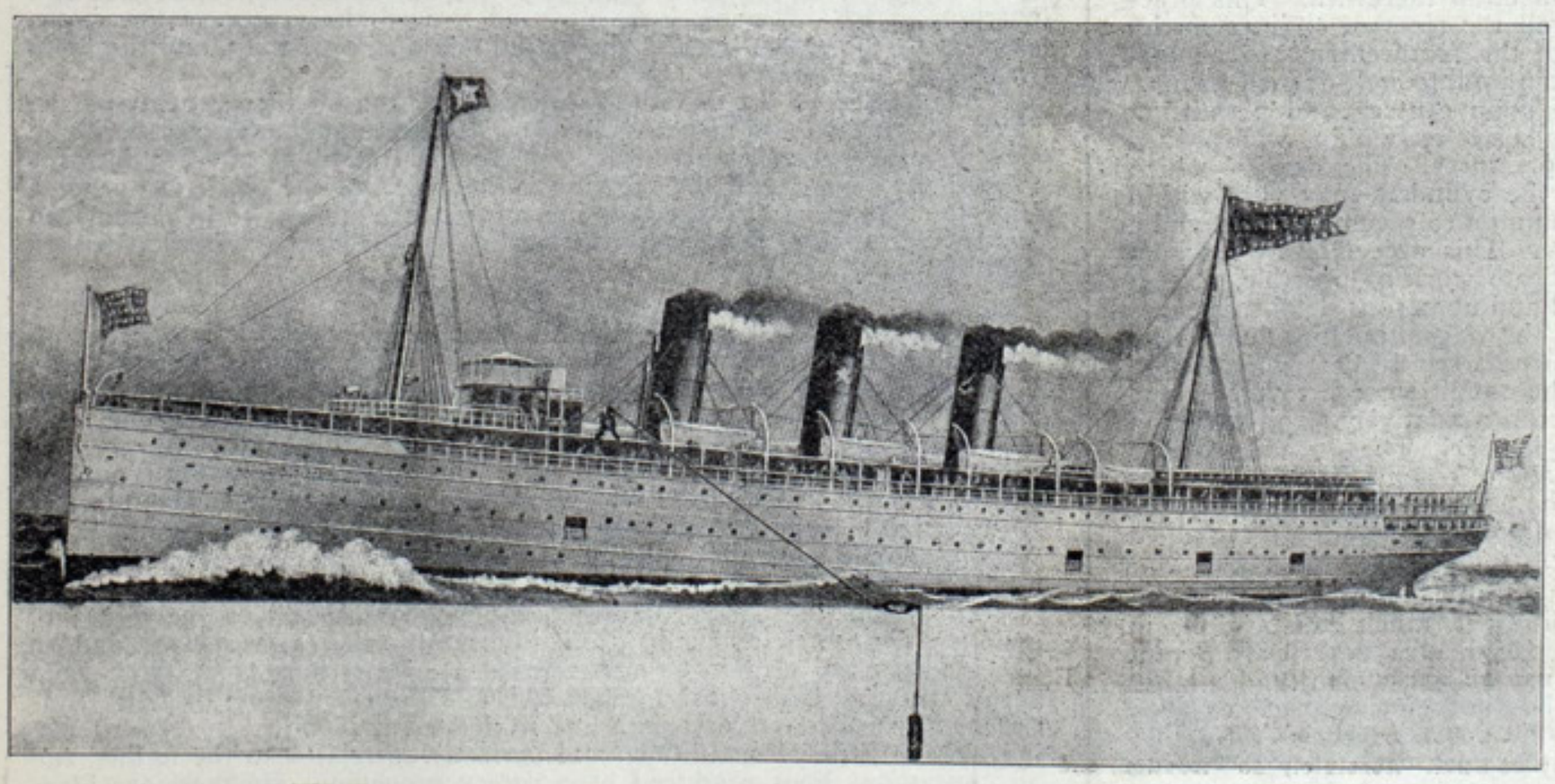
An examination of the figures for the month of August alone, however, shows a marked increase in the importation of articles for use in manufacturing as compared with August of last year, the total of articles in a crude condition in August, 1901, being $24,348,023, against $19,201,638 in August of last year; and the total of articles wholly or partially manufactured, for use in manufacturing, $7,804,063 in August, 1901, as against $4,561,450 in August, 1900. This seems to indicate a marked growth in the imports of manufacturers' materials, which in the early part of the year showed a slight reduction, and it now seems probable that the imports of manufacturers' materials during the calendar year 1901 will exceed those of 1900.

An examination of the figures of quantity, as well as those of price, shows a marked reduction in certain of the articles imported for manufacturing and a marked increase in quantity, although no increase is shown by the figures which measure values. Exports of crude rubber, for instance, increased from 31,808,468 lbs. in eight months of 1900 to 37,377,041 lbs. in the eight months of 1901, while the value meantime fell from $19,938,630 in the eight months of 1900 to $19,304,800 in the same period of 1901. Thus there has been an increase of nearly 20 per cent. in quantity and a slight reduction in value. In raw silk the quantity imported has increased from 5,981,085 lbs. to 7,027,755, comparing the eight months of 1901 with those of 1900; while the value fell meantime from $24,198,631 to $21,849,081—an increase of 17 per cent. in quantity, and a decrease of about 10 per cent. in value.

On the export side the growth is chiefly in agricultural products, which increased $60,000,000, comparing the eight months of 1901 with those of 1900. Products of the mine show a slight increase, those of the forest and fisheries a slight decrease. Manufactures show a decrease of over $36,000,000 for the eight months, the figures for eight months of 1900 being $304,087,505 and those of the eight months of 1901 $267,853,957, a decrease of $36,233,548. An examination of the detailed statement of exports shows that this reduction is chiefly in copper, iron and steel, and mineral oil. The reduction in exports of copper alone is $18,649,227, the figures for eight months of 1900 being $41,830,330, and for the same period of 1901, $23,181,103. The reduction in iron and steel exports is $17,827,830, the exports in eight months of 1900 having been $87,174,209, against $69,346,379 this year. The reduction in exports of mineral oil is $4,418,625, the exports during eight months of 1900 having been $51,204,988, against $46,786,363 this year. These three items, it will be observed, show a total reduction of $40,895,672, or about $4,000,000 greater than the net decrease in all manufactures exported, thus indicating that in other lines of manufactures than these three items there has been an increase. The reduction in mineral oils is entirely explained by the decrease in price per gallon, the total number of gallons exported in eight months of 1901 exceeding by more than 40,000,000 gallons those in the eight months of last year, the figures for the two periods being: For eight months of 1900, 541,365,431 gallons; eight months of 1901, 589,058,603 gallons. The reduction in iron and steel is scattered through a long list of items, the largest single reduction being in metal working machinery, the exports of which fell from $4,712,225 to $1 912,397. Steel rails fell from $7,761,711 to $6,715,113; while in no other single item was the reduction so much as $1,000,000. While it is probable that a part of this reduction is due to the partial suspension of industries in this line during the past few months and a part to the absence of figures of exports to Hawaii and Porto Rico in the 1901 statement, it is equally apparent that the general demand of the world for articles of this class has been reduced, since an examination of the figures of exports of manufactures of metals, including machinery and millwork, from the United Kingdom during the eight months of 1901 also shows a reduction, the figures of 1901 falling more than £6,000,000, or in round terms $30,000,000 below those of the corresponding months of 1900. In copper the reduction is nearly one-half in quantity and value, the total number of pounds exported in eight months of 1900 being 245,907,454, against 134,167,593 in eight months of 1901; while the value, including all manufactures of copper, but excluding ore, was $41,830,330 in eight months of 1900 and $23,181,103 in the same months of 1901.



KIRTLAND SOUNDING APPARATUS IN OPERATION.



KIRTLAND'S SOUNDING APPARATUS TAKING SOUNDINGS AT FULL SPEED.

KIRTLAND SOUNDING MACHINE.

Engravings on this page show the operation of a new sounding machine constructed by Capt. C. E. Kirtland, who has had an extended experience both in sailing vessels and in recovering hulls and cargoes when by a combination of circumstances the vessels had gotten where they should not be. The many years he spent as master of wrecking operations convinced him that the hand lead was too difficult to rely upon its being used frequently enough when most needed, and he resolved upon producing a machine that could be operated, day or night in a storm, by one man with mittens on, and without altering the speed of the vessel. His seafaring friends laughingly told him he would ruin his wrecking business and have to get another job if he did that, and thinking that "there's many a true word spoken in jest," he kept on until the machine grew into its present form and is now finding a market. It has been tried on a number of lake and ocean vessels with favorable results. It consists of a lead (which may be armed or not at the pleasure of the operator), a flexible wire cable, a cylindrical, hollow, steel float and a clutch which allows the cable to pay out without friction, but refuses to slide towards the lead until a trigger is pressed. A brake clutches the rim of the reel, and the crank of the reel is hollow and contains a ratchet lever which engages with teeth on the windlass shaft. Anyone wishing soundings merely raises the ratchet lever in the crank and releases the brake, when the lead, float and clutch drop into the water, the cable paying out with great speed until the lead strikes bottom. The line is then reeled in until the clutch reaches the sheave on the outrigger, when the dial gives a correct reading of the vertical depth of the sounding. The line is then brought in by continued winding. Soundings of 100 fathoms may be taken in one minute, as the machine is always ready when the sheave is rigged outboard, which is its normal position when the ship is not in harbor.

Full descriptive pamphlets will be sent on application to the Farr Telephone Construction Co., 118-120 West Jackson Boulevard, Chicago.

Carleton, Norwood & Co., Rockport, Me., have contracted to build a four-masted schooner for Capt. Frank Magune of Rockport.

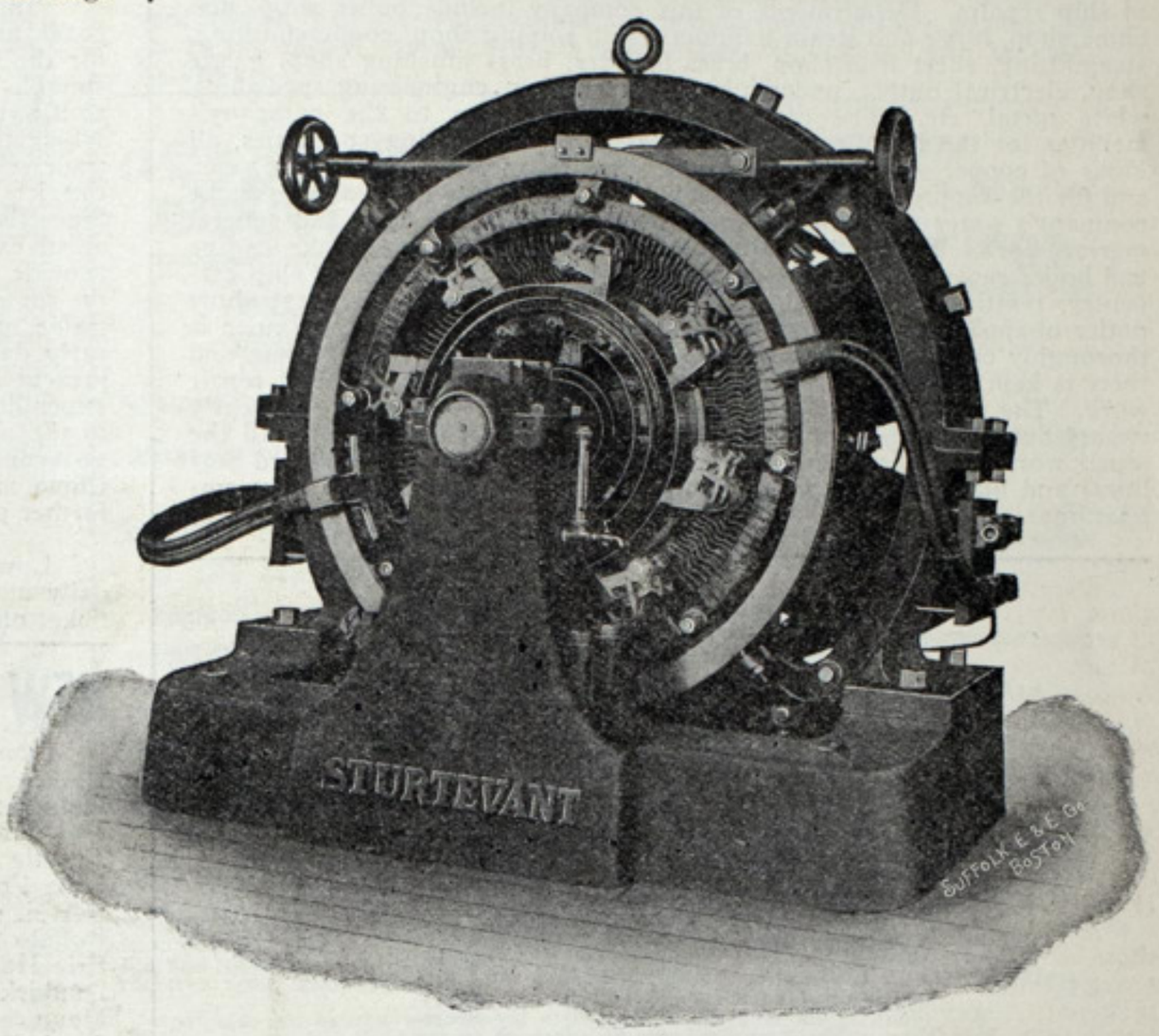
STURTEVANT EIGHT-POLE MOTORS AND GENERATORS.

Motors of this type, as manufactured by the B. F. Sturtevant Co. of Boston, Mass., were primarily designed for direct-connected driving of large fans at low rotative speeds. They are therefore capable of great range of speed, are exceptionally compact and of high efficiency. These qualities especially fit them for direct connection to machine tools and the like.

The magnet frames are of cast steel, cast iron or wrought iron, according to size of requirements. In the smallest size the field cores are cast with the frame and the pole shoes only are removable, but, in the larger sizes readily detachable cores of wrought iron are bolted to the frame. All machines except those for very low speed and high voltage are bar-wound, the two-circuit type being usually adopted. This makes possible the use of a single pair of brushes where only small brush capacity is required. These machines are built in sizes from 1-100 to 50-100, the ratings being based on the horse power delivered per 100 revolutions.

The eight-pole generators are the same in design as the motors of the same type and in the larger sizes the shunt and series coils of the field windings are wound and insulated entirely separate. The brush holder rigging for supporting the holders is so arranged that brushes of opposite polarity are carried on independent rings, which are attached to but insulated from a common ring, which is readily detachable. On a small machine adjustment is by hand; on a large machine by means of a hand wheel and screw. The self-contained character of the armature and commutator especially fits these machines, both motors and generators, to any piece of apparatus, the generators being particularly adapted for engine-driven sets. The same thorough system of protecting against oil and water is employed as in the construction of the other types of machines of Sturtevant manufacture. The large radiating surface and thorough ventilation makes it possible to run these machines at full speed with a maximum temperature-rise not exceeding 30° Cent. on the hottest part.

All sizes are provided with self-aligning, ring-oiling bearings, the sizes below the 15-100-motor being supported in tripod hangers, while the larger sizes are equipped with pedestals and complete bases. The generators are like the motors, built in ten sizes and ranging in capacity from 3 K. W. to 100 K. W.

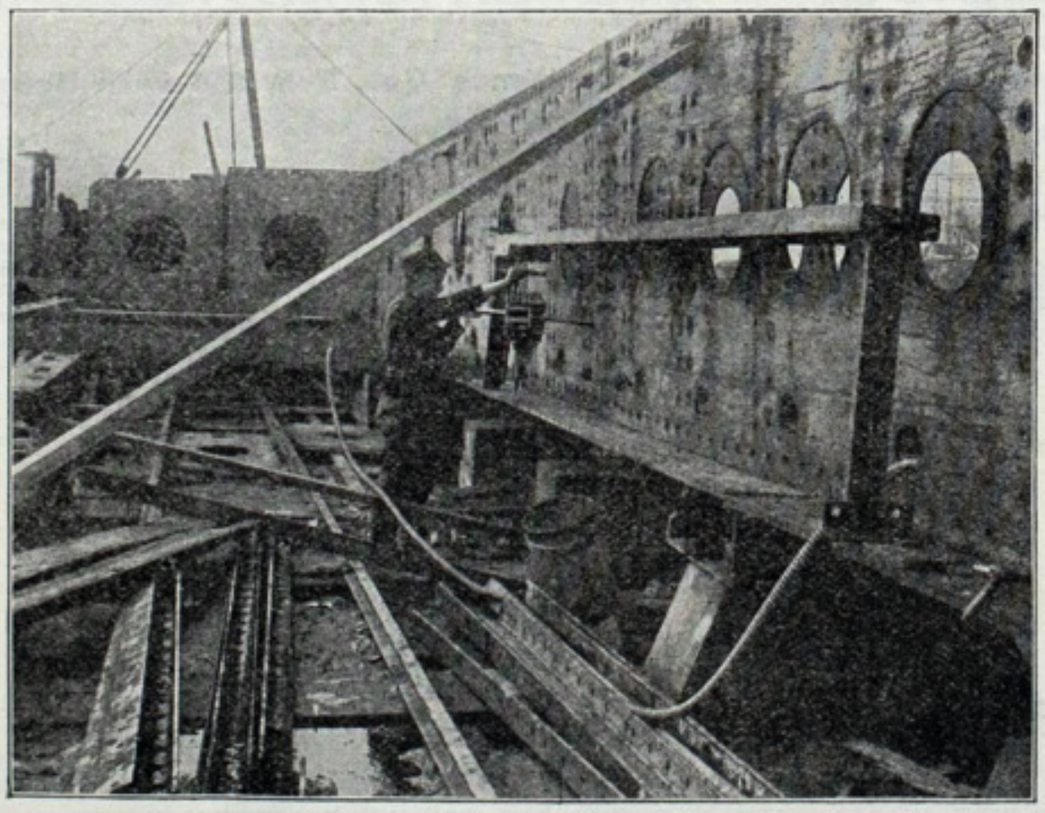


The Ajax Metal Co. of Philadelphia, one of the best known concerns of its kind in the country, has just made public a report of a test of Ajax plastic bronze, made at the works of Messrs. Hughes & Patterson, well known iron manufacturers of Philadelphia. The test was made on a hot bar mill, placing Ajax plastic bronze brass on one end and phosphor bronze brass on the opposite end. Brasses placed in position Nov. 15 measured 7/8 in. in thickness; Feb. 27, 1901, brasses taken out, phosphor bronze then measured 3/8 in. and plastic bronze 5/8 in. On Feb. 27, 1901, new phosphor bronze brass was placed, the original plastic bronze bearing being used; April 29, 1901, again taken out, when it was found that the second phosphor bronze bearing had worn down to useful limit, 3/8 in., while the plastic bronze still measured 7/16 in. "Thus showing," says a letter from the Ajax company, "a saving of over 100 per cent. in favor of Ajax plastic bronze."

For navigation charts apply to the Marine Review.

"Little Giant" PISTON AIR DRILLS

Used extensively in United States, British, French, German, Russian, Italian and Spanish Navy Yards, as well as by the principal Ship Builders and Contractors throughout the world.



"LITTLE GIANT" DRILL ON SHIP WORK.

SENT ON TRIAL; Made entirely of Steel. Absolutely no Vibration, and can be run in a bath of oil.

ACME OF PNEUMATIC TOOL CONSTRUCTION

MADE IN THE FOLLOWING SIZES:

No. 0 Drill, weight 45 pounds, adapted for Boring Cylinders and extra heavy Drilling, Reaming and Tapping.

No. 1 Drill, weight 30 pounds, adapted for Drilling up to 2½ inches and Reaming and Tapping up to 2 inches in diameter.

No. 2 Drill, weight 19 pounds, adapted for Drilling up to 1¼ inches and Reaming and Tapping up to 1 inch in diameter.

No. 3 Drill, weight 8 pounds, adapted for Drilling up to ½ inch diam.

No. 4 Drill, weight 12 pounds, adapted for Drilling up to ⅞ inch diameter and Grinding Steam Pipe Joints.

No. 5 Reversible Boring Machine, weight 14 pounds, adapted for Boring in Wood up to 2½ inches in diameter.

No. 11 Reversible Flue Rolling, Reaming and Tapping Machine, weight 30 pounds, adapted for Flue Rolling up to 4 inches diameter, Reaming and Tapping up to 2 inches.

No. 12 Reversible Flue Rolling, Reaming and Tapping Machine, weight 20 pounds, adapted for Flue Rolling up to 2½ inches diameter, Reaming and Tapping up to 1 inch diameter.

No. 14 Reversible Boring Machine, weight 20 pounds, adapted for Extra Heavy Boring in Wood up to 3½ inches diameter.

ASK FOR NEW CATALOGUE "F."

"LITTLE GIANT" Drills are displacing all other makes of Air Drills.

STANDARD PNEUMATIC TOOL COMPANY,

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Manufacturers of Air Drills, Hammers, Reversible Flue Rolling, Reaming, Tapping and Wood Boring Machines, Motor Chain Hoists, and Pneumatic Tools and Appliances of every Description.

EASTERN OFFICES:
141 Broadway, NEW YORK.

SHIP REPAIRS AND SUPPLIES.

The James Reilly Repair & Supply Co. of 229-30 West street, New York, has just issued a catalogue dealing mainly with its great variety of marine specialties but calling attention also to its facilities for all manner of ship repairs. Departments of this company include boiler shop, machine shop, forge and steam hammers, ship joining shop, coppersmithing, steamfitting, sheet iron shop, brass foundry, brass finishing shop, gauge shop, electrical outfits, pneumatic despatch tubes, engineering specialties, white metal, etc. The catalogue directs attention to the company's facilities for the manufacture of all classes of engineering specialties, all kinds of copper work and engineers' supplies, electrical equipment, etc., and for the supply of tools and machinery; also to the convenience of the company's water front for repairs to steamships, yachts, tugs and general marine work. They are at all times in a position to undertake engine and boiler repairing, the renovating of cabins and all manner of ship carpentry, refitting of hulls, rigging and decks, and the provision at short notice of appliances for handling cargo, etc. A large force of workmen is thoroughly conversant with all classes of shore and marine repairing, and there is kept in stock all supplies necessary for any description of repair work. The West street shops were established in 1867, and for nearly twenty-five years the James Reilly company has done practically all the repair work of the International Navigation Co. (American and Red Star lines) and many other foreign, coastwise and river steamship and steamboat lines.

Treasury Department, Washington, D. C., September 11, 1901. Sealed proposals, on separate forms, are invited and will be received at this Department until 2 o'clock p. m., Saturday, October 12, 1901 (at which time and place they will be opened in the presence of attending bidders), for the construction of one steam propeller for the United States Revenue Cutter Service for harbor duty at Boston, Mass., to be known while in course of construction or until launched as No. 9, R. C. S., and for one steam propeller for said Service, for duty in the St. Marys River, Michigan, to be known while in course of construction or until launched as No. 10, R. C. S. Said vessels are to be constructed in accordance with plans and specifications provided by the Secretary of the Treasury, which, together with forms of proposals, contracts, etc., may be obtained upon application to this Department. Bids must be addressed to the Secretary of the Treasury, and be indorsed on the envelope "Proposals for steamers for Revenue Cutter Service." The right is reserved to reject any or all bids, and to waive defects if deemed for the interest of the Government so to do. O. L. Spaulding, Acting Secretary. Oct. 3.

CANADIAN PACIFIC STEAMSHIP SERVICE.

The annual report of the Canadian Pacific railway, just made public, contains the following reference to the extension and development of its steamship service:

In view of the rapidly increasing development of trade on the Pacific coast, and the desirability of securing as much of that trade as possible for the company's lines, your directors considered it advisable that a suitable line of coasting steamers should be provided by the company and as the steamers and other property and franchises of the Canadian Pacific Navigation Co., actively engaged in the business and with established trade relations, could be secured on terms that appeared to be advantageous, it was deemed desirable to acquire the same, at an expense of $531,000. Since the purchase was made, another steamer has been added to the fleet at an expense of $175,000. Before next season, it may be necessary to provide one more steamer for the northern or Yukon trade, and one for the route between Vancouver and Victoria. The growth of the company's traffic on the Pacific ocean suggests the importance of providing at an early date an additional steamship, somewhat larger and faster than the present Pacific steamships of the company. In order to provide for these expenditures, you will be asked to authorize the issue of steamship bonds to the amount of £480,000 sterling. The contract between the Imperial government and the company for the transportation of mails to and from China and Japan, which expired in April last, has been renewed for a further period of five years on practically the same terms and conditions."

Low Rate Excursion to New York via B. & O.—Tickets on sale daily until Oct. 20 with privilege of returning via Buffalo. Call at city ticket office, 241 Superior street. Oct. 20.

NEW ENGINEER CHARTS OF THE GREAT LAKES JUST ISSUED.

ALL IN COLORS.

	Price, cents.
Duluth and Superior Harbors	50
Two Harbors, Minn.	20
Apostle Islands	50
Lake Front, Chicago, including Calumet Harbor.	30
Detroit River	35
Buffalo Harbor and Niagara River	50
Erie Harbor and Presque Isle	35
Dunkirk Harbor	25
Maumee Bay and Toledo Harbor	35
South Fox island shoals, Lake Michigan	25
Cleveland Harbor	35

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BELLEVILLE GENERATORS

Grand Prix 1889 Hors Concours 1900

Originated 1849 Latest Improvements 1896

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890	67,728	2,460										
1891	68,247	68,331	204									
1892	68,247	68,403	69,822	23,259								
1893	68,379	68,343	68,286	68,247								
1894	68,439	68,367	68,574	68,439	37,701							
1895	68,673	68,766	68,739	68,808	40,887	28,713						
1896	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.

RECOMMENDATIONS FROM ADMIRAL MELVILLE.

Rear Admiral Melville, chief of the bureau of steam engineering, will make some exceedingly important recommendations in his forthcoming annual report to the secretary of the navy. In the navy at the present time probably the most important matter to the commissioned personnel relates to the question of training for engine-room duty. It is proposed to give the present scheme of instructing line officers in the duties of engineers another trial and for this reason the chief engineer will not this year recommend the establishment of the engineer corps. But in order that every facility be afforded to properly instruct the younger officers in the technicalities of machinery, Admiral Melville will urge the necessity for the establishment of a post-graduate course in engineering. He will request the secretary of the navy to recommend to congress that an appropriation be made for the construction at Annapolis of a large building, which will be devoted exclusively to the interests of the engineer. In this building Admiral Melville desires to conduct the post-graduate course in engineering which will be required of a certain selected portion of the ensigns and junior-lieutenants in the service. Numerous occasions occur each year for the testing by the engineer department of various kinds of machinery. Admiral Melville's plan is to have an experimental station established at Annapolis in connection with the school for the training of the young officers. This plan has met with the universal approval of officers of the former engineer corps and it is believed that it will greatly add to the efficiency of the navy.

GROWTH OF PUGET SOUND COMMERCE.

Late figures of the foreign shipping, clearing and arriving at the two ports show Puget Sound to be crowding San Francisco as a foreign shipping port. During the month of June, 1901, there were cleared from Puget Sound sailing cargoes amounting to 28,352 tons, as against 27,922 tons for the same month last year. During the same month there were cleared from San Francisco sailing cargoes amounting to 27,479 tons, as against 40,474 tons for the same month in 1900. During the same month the arrivals at Puget Sound by sail were 11,653 tons, as against 5,107 tons for the same month, while those of San Francisco were 21,192 tons, as against 52,832 tons for the same month the preceding year. In steam tonnage for the months of June of the respective years the difference is even greater than in sail tonnage. The entries at Puget Sound of steam tonnage during the month were 74,878 tons, as against 65,533 for the preceding year, while those of San Francisco were 57,752, as against 65,130 for the same month of 1900. This excellent showing of Puget Sound for June was repeated in July, when the sail tonnage clearing was 23,193 tons, as against 15,070 for July last year, while San Francisco made a showing of but 14,028 tons cleared, as against 18,570 the July previous. In steam tonnage clearances the story told by the figures is practically the same, being for Puget Sound 95,949, as against 78,008 last year, while San Francisco shows but 43,203, as against 56,053 tons for July, 1900.

The 1901 catalogue of Marine Iron Works, station A, Chicago, is sent free on their receiving request. It is descriptive of their product, so far as the special line of work in which they are engaged can be catalogued. 2

"Steel Ships

THEIR CONSTRUCTION AND MAINTENANCE."

A valuable work, just from the press, by THOMAS WALTON, Author of "Know Your Own Ship."

Not highly technical, but well suited to Ship Superintendents, Marine Engineers, and Students of ship construction.

Introduction deals with steel from its crude state in ore to finished product in ship material. Then follows chapters dealing with principal structural features and alternative modes in which a vessel may be built. Largest section of the book treats in detail of the construction and combination generally of the various parts which go to make up the whole ship structure—framing, plating, stern frames and rudders, riveting, pumping and ventilation, and includes also remarks upon launching.

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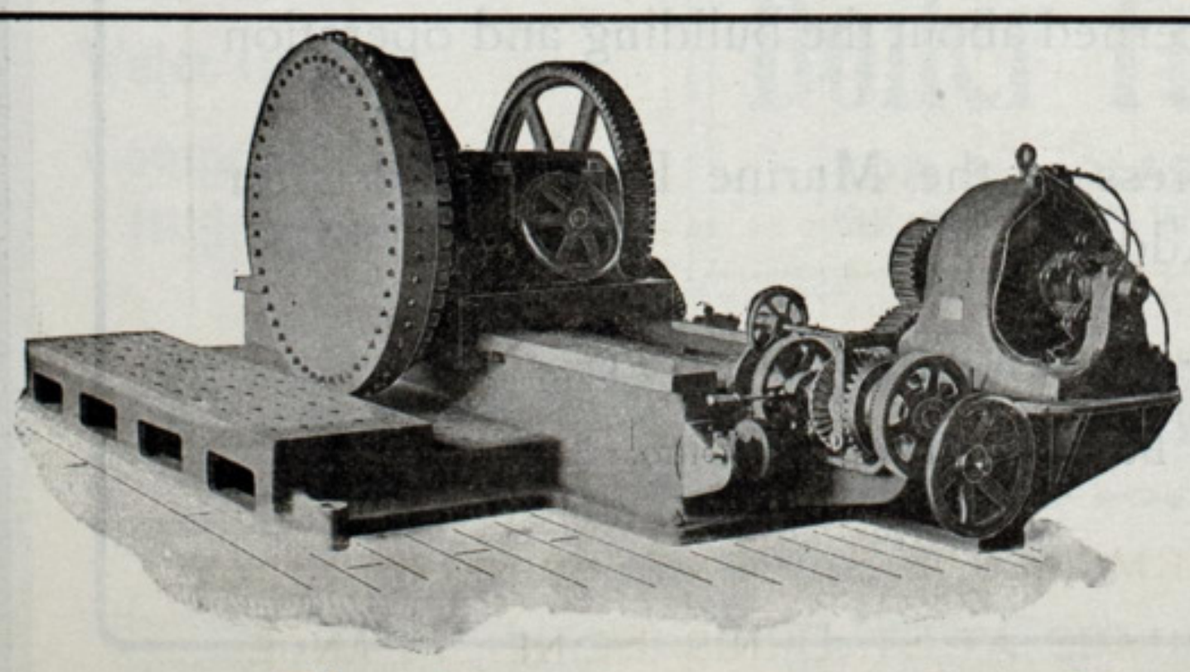

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The book is bound in white duck and stamped with blue ink and is most fetching to the eye. Between its covers 500 pages are devoted to defining the meaning of words in nautical literature. If there is a word in that ought to be out, or a word out that ought to be in, we should know it. We don't think there is.

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Half interest in steambarge of 776 tons, A2 class and capable of carrying 950 tons of coal or 650 M ft. lumber. Compound engine and good boiler, the latter allowed 120 lbs. steam pressure. Address or apply to J. E. M., 23 Lodge avenue, Cleveland, O. d

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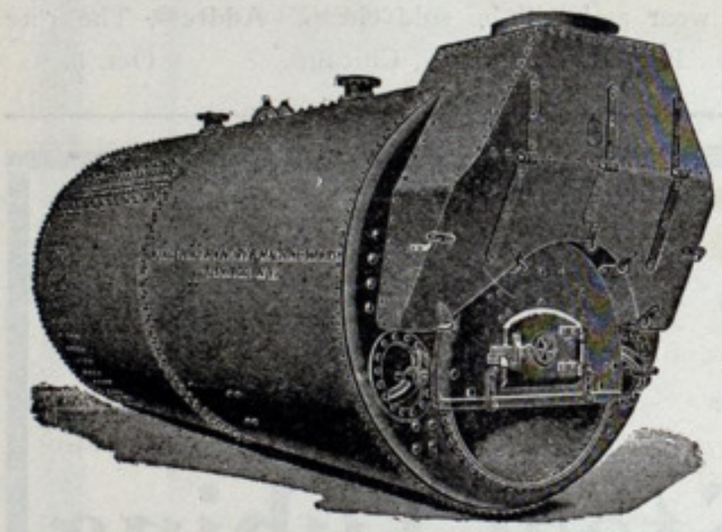

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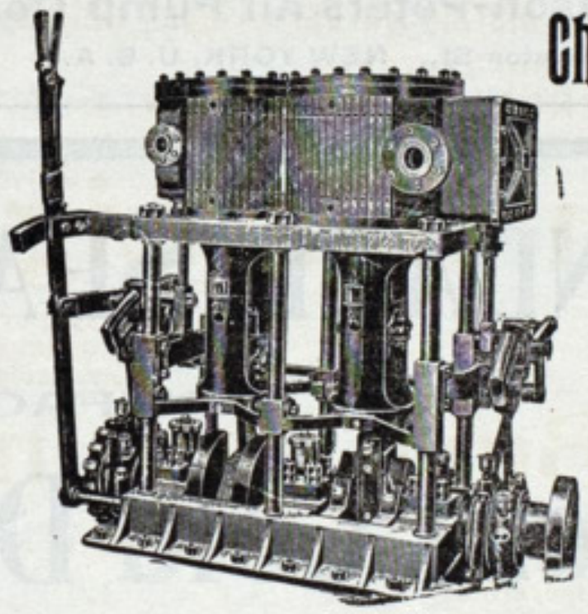

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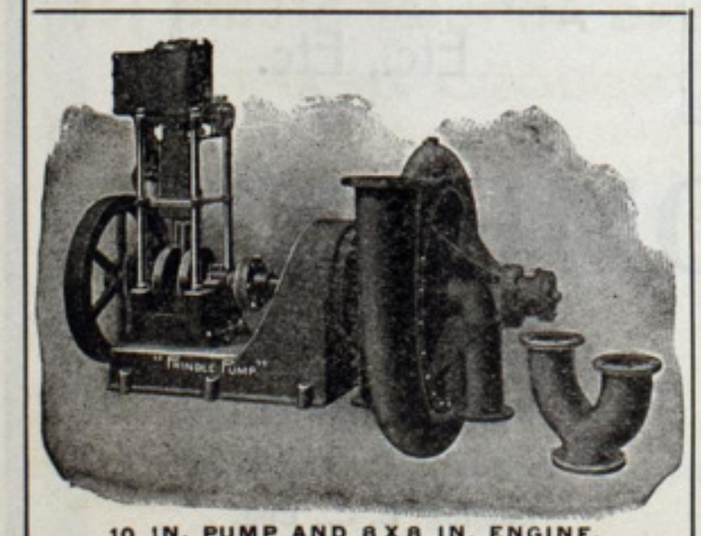

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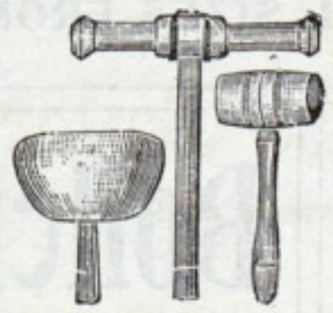

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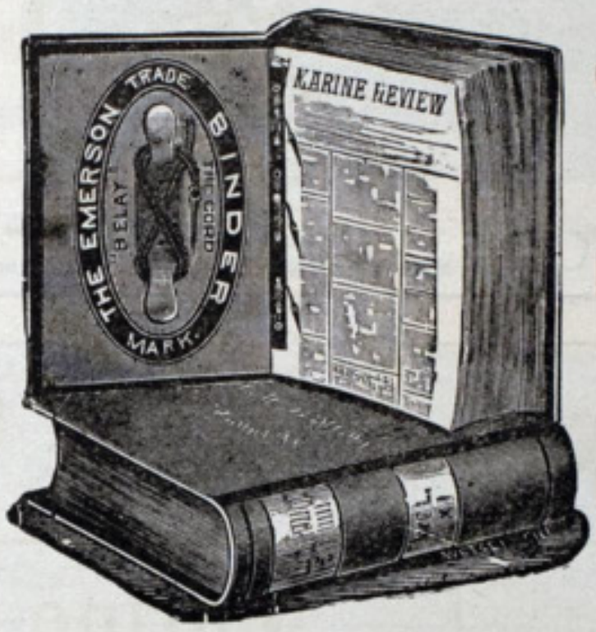

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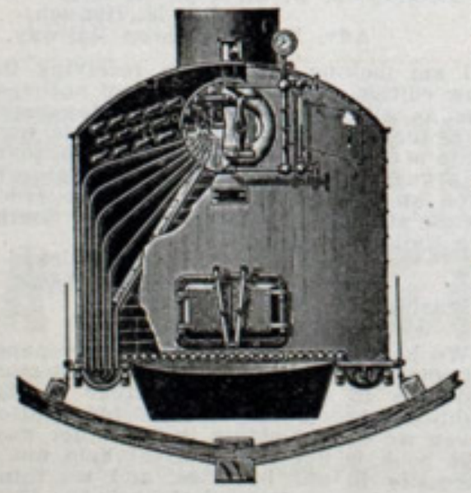

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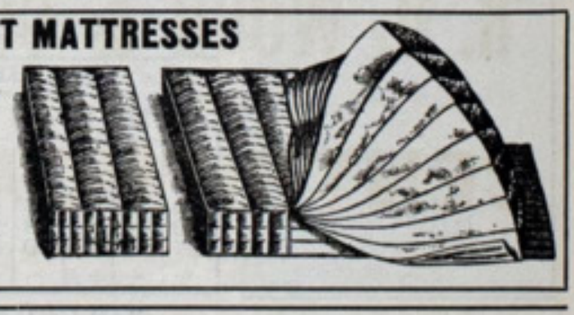

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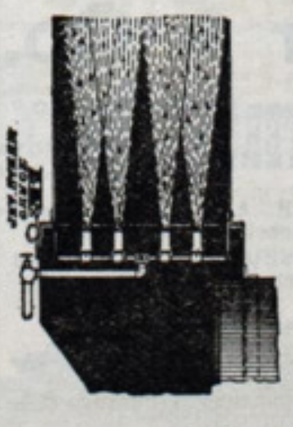

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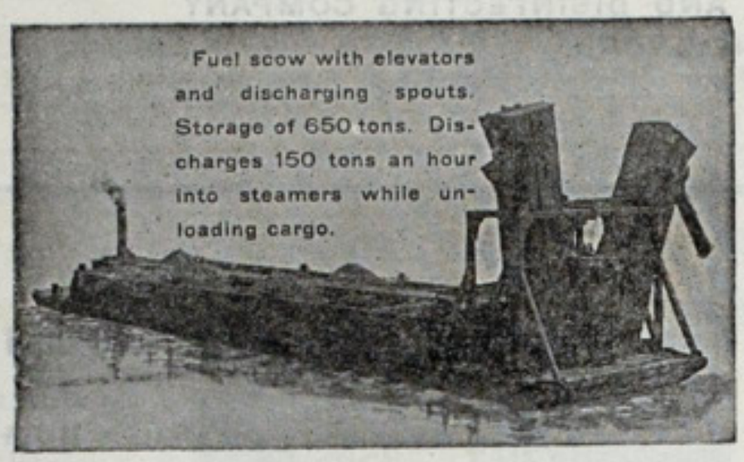

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BUFFALO.

We should hardly know how to get along without the American Newspaper Directory. We regard it by all odds the most complete and reliable guide that the advertiser can make use of; in fact, we use no other.

Buffalo, N. Y., July 24, 1901.
R. V. Pierce, M. D.,
President World's Dis. Med. Ass'n.

VERMONT.

The American Newspaper Directory stands, as it has always stood, the first and best of newspaper directories—the only one which cannot be ignored, the only one which every advertiser must have. No other can take its place; no other is needed—Joseph Auld, in the Burlington (Vt.) News of July 3, 1896.

ADVISOR.

The Advisor accepts the American Newspaper Directory as the standard in newspaper ratings. The obstacles which obstruct its efforts to get true and reliable information are many.

* * * *

The directory question is one which interests every publisher in the country—nay, the entire world. But in the United States directories are becoming altogether too numerous. In this, as with other books of reference, it is necessary to have one which may be relied on as being an authority on the matter of newspaper circulations. There can be no question about the fact that at this time, as for many years past, the American Newspaper Directory is that authority. The Advisor is not paid to make this announcement. It makes the statement in the interests of advertisers and publishers because it is true. One thing the advertiser is almost cock-sure of when he refers to the American Newspaper Directory is that the circulation figures he sees therein are not overstated to any great extent. In most other directories they are. Only the publisher himself is to be blamed for not securing a proper rating in that publication, and every advertiser of consequence knows it. Thus the publisher who refuses to furnish a statement places himself under a reasonable suspicion.—The Advisor for June.

New York, June, 1901.

CHICAGO.

Messrs. Geo. P. Rowell & Co.'s American Newspaper Directory has long since earned the reputation of being the best of its character. It contains the results of patient, expensive and systematic effort to secure all attainable information of interest concerning American newspapers. The work has been honestly done. This will not be questioned by any unprejudiced examiner. The most important question is circulation. In attempting to give this information the editor of the Directory encounters his most difficult work. It is the aim and necessity of the Directory to give the truth. The American Newspaper Directory is to-day the dependence and guide, in a greater or less degree, of every large advertiser in the country.—Chicago (Ill.) Daily News.

BATES.

The American Newspaper Directory is the only reliable guide for the advertiser.

No man who advertises can afford to do without it.

What Bradstreet and Dun are to the mercantile world the American Newspaper Directory is to the world of periodical publications.

A new advertiser will get from the American Newspaper Directory a better idea of the greatness of his country, and the tremendous possibilities in newspaper advertising, than from any other source.

If an advertiser spends only $100 a year he should have the American Newspaper Directory. For his business may grow and his right expenditure of his money become increasingly important. The time to learn how to spend $10,000 is before it is spent, otherwise the spending may be disastrous.

Many times the best paper in town costs the advertiser no more than the poorest. The American Newspaper Directory tells which is which.

The paper that was the leader in its town five years ago may lag behind today. Even one year may witness astonishing changes. If you are spending money for publicity it is vastly important that you should know where to get the most of it for the price. The American Newspaper Directory gives not only the present circulation rating of every paper in America, but shows their history by quoting past ratings.

The book costs five dollars a copy, and a single reference to it may readily save or make many times its cost.

All newspaper directories but one are erroneously optimistic about circulations. The American Newspaper Directory may occasionally err on the other side, but that makes it all the safer for the advertiser.

My advertising experience began in 1885, and one of the first things I did was to buy a copy of the American Newspaper Directory.

For sixteen years Rowell's "The American Newspaper Directory" has had a place of honor and usefulness on my desk.

Many a publisher is ready to prove by other directories that "Rowell's is wrong," but few indeed can be induced to prove it by opening their circulation books to the advertiser.

Among publishers who are not willing that their real circulations be known it is the best hated book in print. The moral is not far to find.

Charles Austin Bates.
New York, June 24, 1901.

PABST.

If the improvement of the American Newspaper Directory continues in the future as it has during the past twenty years I do not think I shall live long enough to see any other directory take its place. There will, however, be the usual crop of directories, just as every other good thing is imitated. Your long years of experience in dealing with evasive circulation reports have most admirably fitted you for placing a proper valuation upon such statements. Advertisers have come to know that the Rowell estimates are nearer the proper figure than can otherwise be obtained. The American Newspaper Directory is therefore indispensable in every well regulated advertising department. Lines are being more tightly drawn every day; it is difficult to collect for twenty thousand when you print only eight. If the advertiser were buying barley he would not accept three pecks for a bushel, although the quality might at all times be open for discussion.

The American Newspaper Directory is the guide and companion of the advertising man, and it is to the interests of all concerned to help perfect it, support it and hurrah for it.

Pabst Brewing Co.,
J. R. Kathrens, Adv. Mgr.
Milwaukee, Wis., June 7, 1901.

SAPOLIO.

A growing need created it—the advertising agency system. One of the earliest and most successful workers, Geo. P. Rowell, is still in the field. He originated methods. Others followed. A first early step in advance was his publication of a list of all the papers—the American Newspaper Directory. He has never ceased to love it, and labor for it. Soon, out of the gross stupidity of imitation, it became a rule that every agency down to those of Oshkosh or Oklahoma must issue its own directory. An awful waste, for not more than one out of ten was worth shelf room. If the National Association of Advertising Agents could agree long enough to buy Mr. Rowell's Directory, publish it officially and drop all the others, it would accomplish something.

Artemas Ward,
Advertising Manager for Sapolio.
—In Fame, March, 1901.

WASHINGTON.

Every page of the American Newspaper Directory breathes the desire of its publishers that it shall be absolutely correct in every statement it makes.

Truly yours, Frank Roe Batcheld,
Clerk of the Committee on Banking and Currency, House of Representatives, U. S.
Washington, D. C., Jan. 17, 1899.

SOUTHERN.

We subscribe to and pay cash for the American Newspaper Directory, and find it of great value in our advertising department. We have 6,892 miles of railway, extending from Washington, D. C., all over the South, and in advertising this system we use more than 1,000 publications, and in selecting this list we find that we get a correct idea of circulation from this Directory that can not be obtained from any other similar publication. We receive other newspaper directories gratis; but the fact that we pay cash for this one in addition shows that we can not place the same dependence upon the "free list."

We thoroughly appreciate the careful manner in which this Directory is compiled.

Washington, D. C., Sept. 13, 1900.
Jos. H. Hannen,
Adv. Dept. Southern Railway.

I am looking forward to receiving the new edition with a great deal of anticipation as, although the American Newspaper Directory seemed to have reached a high state of perfection several years ago, there is always something new and of value in each succeeding edition. It is regarded as the standard authority with the Southern Railway.

S. H. Hardwick,
General Passenger Agent.
Washington, D. C., May 21, 1901.

BALTIMORE.

We have used the American Newspaper Directory for many years and find it more valuable to us than any other similar publication. Much of the information given we cannot obtain in any other way. The book is not only a great help but a necessity to our business, and we think its way of stating circulations is the ideal one. A. C. Meyer & Co.,
Prop'rs of Dr. Bull's Cough Syrup, etc.
Baltimore, July 31, 1901.

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IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

LATHES OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.
Pratt & Whitney Co.....Hartford, Conn.

LAUNCHES—NAPHTHA, ELECTRIC.
Gas Engine & Power Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co.....Boston.
Porter's Sons' Co., Wm.....New York.

LOGS.
Walker & Son, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

MACHINE TOOLS (WOOD WORKING).
Atlantic Works, Inc.....Philadelphia.

MACHINE TOOLS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.
Pond Machine Tool Co.....Plainfield, N. J.
Pratt & Whitney Co.....Hartford, Conn.

MALLETS FOR CAULKERS, BOILER MAKERS, ETC.
N. Y. Mallet & Handle Works.....New York.

MARINE RAILWAYS, BUILDERS OF
Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.
Lein, Irvine & Co.....New York.

MECHANICAL DRAFT FOR BOILERS.
American Blower Co.....Detroit.
American Ship Building Co.....Cleveland.
Boston Blower Co.....Hyde Park, Mass.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.
Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.....Boston, Mass.

MILLING MACHINES OF ALL KINDS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.
Gaskin, Edward.....Buffalo.
See, Horace.....New York.
Wood, W. J.....Chicago.

OAKUM.
Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Crane Co.....Chicago.
Garlock Packing Co.....Palmyra, N. Y.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Sayen & Schultz.....Philadelphia.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Toch Bros.....New York.
Upson-Walton Co.....Cleveland.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PIPE THREADING AND CUTTING MACHINES.
Merrell Mnfg. Co.....Toledo, O.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.
Crane Co.....Chicago.

PLANERS OF ALL KINDS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PLATE BENDING AND PLANING MACHINES.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood & Co., R. D.....Philadelphia.

PLUMBING, MARINE.
Reilly Repair & Supply Co., James.....New York.
Sands, Alfred B. & Son.....New York.

PNEUMATIC TOOLS.
Standard Pneumatic Tool Co.....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston.

PRESSURE REGULATORS.
D'Este Co., Julian.....Boston.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Ship & Engine Co.....Quincy, Mass.
Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath, Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.

PROJECTORS, ELECTRIC.
Badt-Goltz Engineering Co.....Chicago.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Seidler-Miner Electric Co.....Detroit.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Wood, R. D. & Co.....Philadelphia.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood, R. D. & Co.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Automatic Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

R. I. W. DAMP RESISTING PAINT.
Toch Bros.....New York.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER GOODS.
Hale Rubber Co., Alfred.....So. Boston, Mass.

RUBBER INSULATED WIRES.
Roebling's Sons, John A.....New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SEAM COMPOSITION AND ELASTIC SEAM PAINT.
Cole & Kuhls.....Brooklyn.

SEARCH LIGHTS.
Badt-Goltz Engineering Co.....Chicago.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Seidler-Miner Electric Co.....Detroit.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

SHAPERS.
Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.
Pratt & Whitney Co.....Hartford, Conn.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Trigg, Wm. R. Co.....Richmond, Va.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Moran Bros. Co.....Seattle, Wash.
Reilly Repair & Supply Co., James.....New York.
Upson-Walton Co.....Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.
Algoma Central Co.....Sault Ste. Marie, Ont.
American Line.....New York.
Cleveland & Buffalo Transit Co.....Cleveland.
Dominion Line.....Boston.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL CASTINGS.
Seaboard Steel Casting Co.....Chester, Pa.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.
Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

SUBMARINE DIVING APPARATUS.
Hale Rubber Co., Alfred.....So. Boston, Mass.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.
Gaskin, Edward.....Buffalo.
See, Horace.....New York.
Wood, W. J.....Chicago.

TELEGRAPH—DECK AND ENGINE ROOM.
Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.
Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.

THERMOMETERS FOR MECHANICAL PURPOSES.
Helios-Upton Co.....Peabody, Mass.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Pond Machine Tool Co.....Plainfield, N. J.
Pratt & Whitney Co.....Hartford, Conn.
Standard Pneumatic Tool Co.....Chicago.
Watson-Stillman Co.....New York.
Wood, R. D. & Co.....Philadelphia.

TOOLS, WOOD WORKING.
Atlantic Works, Inc.....Philadelphia.

TOPOPHONE—Prevents disasters in fogs.
Colt Co. J. B.....New York.

TOWING MACHINES.
American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co.....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.....Midland, Ont.
Swain Wrecking Co.....Detroit.

TRAPS, STEAM.
D'Este Co., Julian.....Boston.
Haines Co., Wm. S.....Philadelphia.

TRUCKS.
Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.
Benedict & Burnham Mnfg. Co.....Waterbury, Conn.
Standard Seamless Tube Co.....Pittsburg.

VALVES, STEAM SPECIALTIES, ETC.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crane Co.....Chicago.
Crosby Steam Gage & Valve Co.....Boston.
D'Este Co., Julian.....Boston.
Jenkins Bros.....New York.
Wood & Co., R. D.....Philadelphia.

VARNISH PAINT.
Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.
Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Chamberlain & Co., S. R.....Chicago.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Hall & Root.....Buffalo.
Helm, D. T. & Co.....Duluth, Minn.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Kennedy Hunter & Co.....Antwerp.
Mitchell & Co.....Cleveland.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Tandy, Frank N.....Boston.

VENTILATING APPARATUS FOR SHIPS.
American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.
American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A.....New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

WINDLASSES.
American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.
Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.
Donnelly Salvage & Wrecking Co.....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.....Midland, Ont.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.
Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

YAWLS.
Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

Algoma Central Steamship Line..... 39
Almy Water Tube Boiler Co...... 11
American Blower Co...... 40
American Line..... 7
American Ship Building Co...... 1
American Ship Windlass Co...... 2
American Steam Gauge Co...... 1
American Steel & Wire Co...... 1
Armstrong Cork Co...... 40
Ashton Valve Co...... 12
Atlantic Works..... 5
***Atlantic Works, Inc.**..... 7

Babcock & Wilcox Co...... 11
Badt-Goltz Engineering Co...... 29
Baldt Anchor Co...... 9
Baker, Howard H. & Co...... 6
Bath Iron Works, Ltd...... 1
Rement, Miles & Co...... 3
Benedict & Burnham Mnfg. Co..... 27
Bertram's Oil Polish Co...... 1
Big Four Railway..... 39
Blake, Geo. F., Mnfg. Co...... 9
***Bliss, John & Co.**..... 30
***Bloomsburg & Co., H.**..... 31
Boland, J. J...... 34
Boston Blower Co...... 4
***Boston & Lockport Block Co.**..... 40
***Boyer Water Tube Boiler Co.**..... 31
Bourne-Fuller Co...... 12
Brown & Co...... 34
Brown Hoisting Machinery Co., Inc..... 2
Buffalo Dry Dock Co...... 11
Buffalo Forge Co...... 12

Castner, Curran & Bullitt...... 33
Chamberlain & Co., S. R...... 34
Champion Rivet Co...... 8
Chase Machine Co...... 8
Chicago Ship Building Co...... 2
*Clayton Fire Extinguishing & Disinfecting Co..... 31
Cleveland & Buffalo Transit Co...... 31
Cleveland City Forge & Iron Co...... 6
Cleveland Punch & Shear Works Co..... 27
C. C. C. & St. L. R. R...... 39
Cole & Kuhls...... 9
Colt Co., J. B...... 10
Continental Iron Works...... 2
Cory, Chas. & Son...... 10
***Craig Ship Building Co.**..... 30
Cramp, Wm. & Sons, S. & E. B. Co..... 1
Crandall & Son, H. I...... 7
Crane Co......2-6
Crosby Steam Gage & Valve Co...... 12

Dearborn Drug & Chemical Works...... 30
D'Este Co., Julian...... 3
Delauney, Belleville & Co...... 26
Delaware River Iron S. B. & E. Works. 5
Detroit Shipbuilding Co..... 1
Dixon Crucible Co., Joseph...... 9
Dominion Line..... 12
Donnelly Salvage & Wrecking Co...... 27
Drake & Maytham...... 34
Drein, Thos. & Son...... 4
Duluth, South Shore & Atlantic Ry...... 39

Electro-Dynamic Co...... 1
Elphicke, C. W. & Co...... 34
Elwell-Parker Electric Co...... 2
Erie & Western Trans. Co...... 27

Falls Hollow Staybolt Co...... 4
Farrar & Trefts...... 5
Fletcher, W. & A. Co...... 4
Fogg, M. W...... 31
Fore River Ship & Engine Co...... 5

Garlock Packing Co...... 27
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated...... 31
Gaskin, Edward..... 34
General Electric Co...... 12
Gilchrist, Albert J...... 34
***Gleason-Peters Air Pump Co.**..... 29
Goerz, C. P..... 9
Goulder, Holding & Masten...... 34
Graphite Lubricating Co...... 9
Great Lakes Register...... 7

Haines Co., Wm. S...... ..
Hale Rubber Co., Alfred...... 9
Hall & Root...... 34
Hamilton-Foster Fog Signal Co...... 3
Hanna, M. A. & Co...... 32
Harlan & Hollingsworth Co., The...... 5
Helios-Upton Co...... 8
Helm, D. T. & Co...... 34
Herriman, F. D...... 7
Hodge, S. F. & Co...... 8
Holmes, Samuel...... 34
Hoyt, Dustin & Kelley...... 34
Hunt, Robert W. & Co...... 34
Hutchinson & Co...... 34
Hyde Windlass Co...... 40

International Anchor Co...... 9
International Navigation Co...... 7

Jenkins Brothers.....6-10
Jenks Ship Building Co...... 39

Kahnweiler's Sons, David...... 4
Katzenstein, L. & Co...... 4
Keith, J. G. & Co...... 34
Kennedy Hunter & Co...... 3
Kingsford Foundry & Machine Works.. 30

Lake Shore Engine Works...... 1
Lane & DeGroot...... 4
***Learmonth, Robert.**..... 30
Lein, Irvine & Co...... 29
Lidgerwood Mfg. Co...... 10
Lockwood Mnfg. Co...... 4
"Long Arm" System Co...... 3
L. S. & M. S. Ry...... 39

MacDonald, Ray G...... 34
MacKinnon Mfg. Co...... 8
Mair, John & Son...... 6
***Marine Iron Co.**..... 7
Martin-Barriss Co...... 8
Maryland Steel Co...... 5
Merrell Mnfg. Co...... 5
Midland Towing & Wrecking Co., Ltd.. 40
Miller, Walter...... 9
Mitchell & Co...... 34
Monongahela Iron & Steel Co...... 3
***Moran Bros. Co.**..... 39

Neafie & Levy Co...... 5
***Newhall Chain Forge & Iron Co.**..... 30
Newport News Ship Building & Dry Dock Co...... 5
New York Mallet & Handle Works...... 30
Niles Tool Works Co...... 3
Nixon, Lewis...... 5
North River Iron Works...... 4

Olds Motor Works...... ..
Osborne & Co., F. H...... 34

Page Bros. & Co..... 4
Parker, A. A. & B. W...... 32
Peck, Chas. E. & W. F...... 7
Phosphor Bronze Smelting Co., Ltd...... 8
Pickands, Mather & Co...... 32
Pinney, Orestes C...... 34
Pittsburg Coal Co...... 33
Pittsburg Testing Laboratory, Ltd...... 34
Pond Machine Tool Co......
Porter's Sons' Co., Wm...... 4
Powell, Ambrose V...... 34
Pratt & Whitney Co......
Pusey & Jones Co...... 5

Queen City Engineering Co...... 10

Red Star Line...... 7
***Reilly Repair & Supply Co., James.**.... 10
Reynolds, H. J...... 9
Richards, Mills & Co...... 12
Richardson, W. C...... 34
Risdon Iron Works...... 5
***Ritchie & Sons, E. S.**..... 30
Roach's Ship Yard...... 5
Roberts Water Tube Boiler Co...... 11
Robins Conveying Belt Co...... 1
Rochester & Pittsburgh Coal & Iron Co. 33
***Roebling's, John A. Sons Co.**..... 40
Rushmore Dynamo Works...... 4

Safety Car Heating & Lighting Co...... 31
Sands, Alfred B. & Son...... 10
Sayen & Schultz...... 1
Scherzer Rolling Lift Bridge Co...... 6
Schrader's Son, A..... 8
Scott Co., The W. L...... 32
Seaboard Steel Casting Co...... 27
See, Horace...... 34
Seidler-Miner Electric Co...... 8
Sheriffs Mfg. Co...... 10
Shipowners Dry Dock Co...... 12
Skinner Chuck Co...... 3
Smith, Stanley B. & Co...... 33
Smith, W. Blackburn..... 1
Standard Chain Co...... 10
***Standard Oil Co.**..... 6
Standard Releasing Hook Co...... 2
***Standard Pneumatic Tool Co.**..... 25
Standard Seamless Tube Co...... 29
Stirling Co...... 11
Stowe & Graydon...... 34
Stratford Oakum Co., Geo...... 31
Sturtevant, B. F. Co...... 40
Sullivan & Co...... 34
Swain Wrecking Co...... 32

Tandy, Frank N...... 34
Taylor Boiler Co...... 11
Thurston & Bates...... 34
Toch Bros...... 29
Trigg Co., Wm. R...... 4
Trout, H. G...... 9

Upson-Walton Co...... 40
U. S. Metallic Packing Co...... 40

Walker, Thomas & Son...... 3
Watson-Stillman Co...... 39
Westinghouse Electric & Mnfg. Co...... 6
Wheeling & Lake Erie R. R...... 39
White, Johnson, McCaslin & Cannon.... 34
*Willard, Chas. P. & Co..... 30
Wilson, Thomas...... 34
Wilson & Silsby...... 6
Wood, W. J...... 34
***Wood & Co., R. D.**..... 30
Worthington, Henry R...... 9
Wright, Herbert & Co...... 34

Youghiogheny & Lehigh Coal Co...... 33

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FOR MARINE AND SHIP YARD USE.

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LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE 237 SUPERIOR ST

Eastward:—	Ar. fr. West.	Dep. East.
No. 18, Southwestern Limited	.....	*1 55 am
No. 22, Lake Shore Limited	*2 15 am	*2 20 am
No. 26, Pan-American Express	*5 50 am	*6 00 am
No. 28, New York & Boston Express	*7 40 am	*8 00 am
No. 32, Fast Mail	*11 25 am	*11 30 am
No. 44, Accommodation, via Sandusky	†1 35 pm	.....
No. 46, Southwestern Express	.....	*3 00 pm
No. 6, Limited Fast Mail	*5 40 pm	*5 45 pm
No. 10, Chicago, New York & Boston Special	*7 35 pm	*7 40 pm
No. 16, New England Express	*10 30 pm	*10 35 pm
No. 2, Day Express	†9 05 pm	†11 30 pm
No. 126, Norwalk Accommodation	†7 55 am	.....
No. 40, Toledo & Buffalo Accom., via Norwalk	†10 00 am	†11 40 am
No. 106, Conneaut Accommodation	.....	†4 30 pm
Westward:—	**Ar. fr. East.**	**Dep. West.**
No. 11, Southwestern Limited	*3 25 am	.....
No. 15, New York, Boston & Chicago Special	*3 05 am	*3 10 am
No. 21, New York & Chicago Express	*5 10 am	*5 20 am
No. 7, Day Express	.....	†6 30 am
No. 19, The Lake Shore Limited	*7 35 am	*7 40 am
No. 23, Western Express	*11 10 am	*11 15 am
No. 33, Southwestern Express	*12 25 pm	.....
No. 133, Cleveland & Detroit Express	.....	*12 30 pm
No. 47, Accommodation	.....	†3 00 pm
No. 141, Sandusky Accommodation	.....	†3 10 pm
No. 127, Norwalk Accommodation	.....	†5 10 pm
No. 37, Pacific Express	*7 00 pm	*7 20 pm
No. 25, Southern Express	*9 30 pm	.....
No. 3, Fast Mail Limited	*10 50 pm	*10 55 pm
No. 115, Conneaut Accommodation	†8 30 am	.....

*Daily. †Daily except Sunday. Trains Nos. 28 and 37 run via Erie station.

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On the first and third Tuesdays of each month, one way first class limited individual "Settlers Tickets" will be on sale to many points in the following territory: Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee.

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W. P. DEPPE, A. G. P. & T. Agt. CINCINNATI, O.
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ALGOMA CENTRAL S. S. LINE.

Steamer OSSIFRAGE
Passenger and Freight,
TOLEDO to SAULT STE. MARIE

Leaves Toledo every Friday, at 11.00 a. m. (central time) calling at Windsor, Sarnia, Goderich, Kincardine, Southampton, Little Current. Arrive Sault Ste. Marie Sunday 12.00 night (eastern time). Returning leave Sault Ste. Marie Tuesday at 8.00 a. m.

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Passenger and Freight,
SAULT STE. MARIE to MICHIPICOTEN.

Tri-weekly service, calling at intermediate points by arrangement.

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Space under this heading 25 cents a line, each insertion, for three insertions or less. Special rates for periods of more than three insertions.

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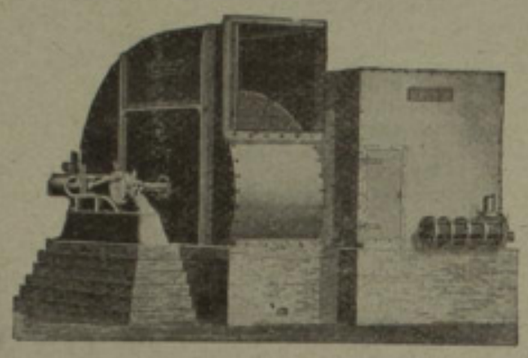

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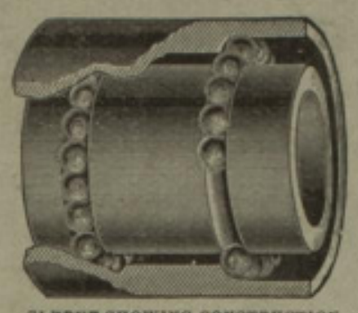

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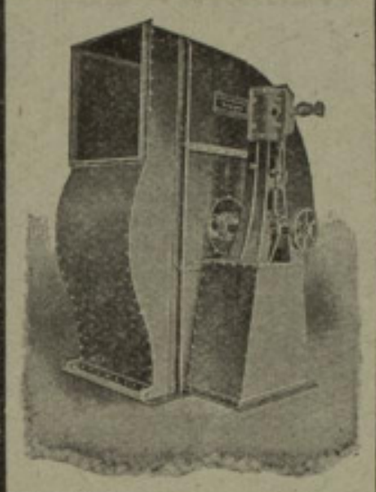

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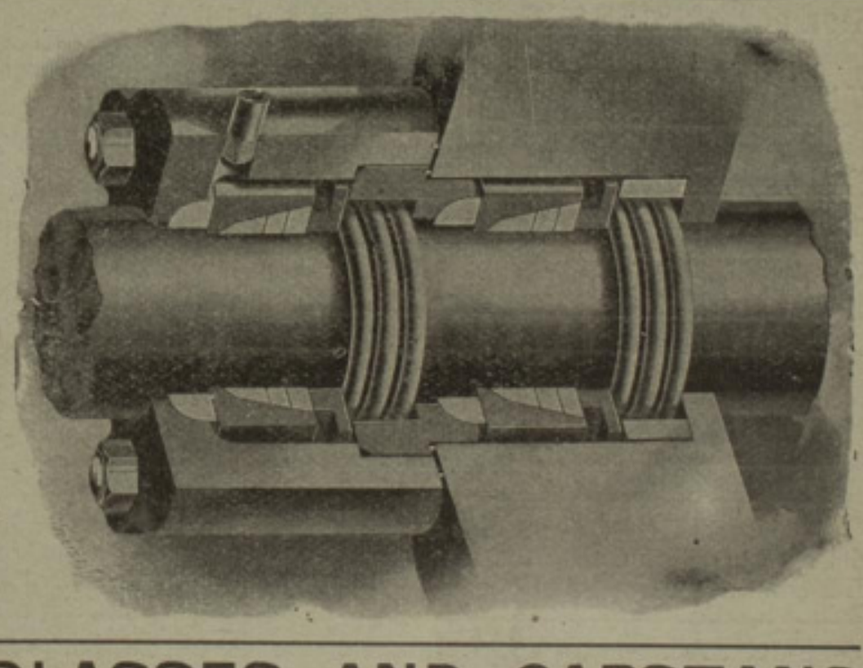

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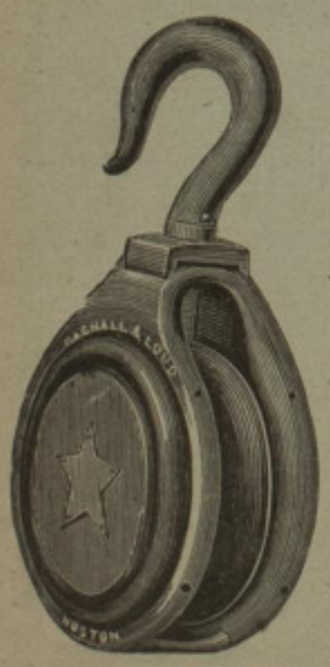

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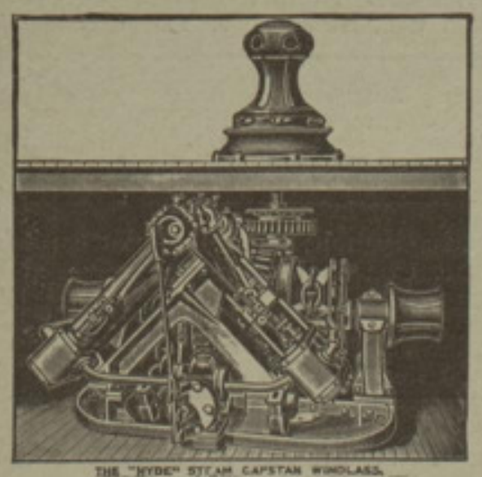

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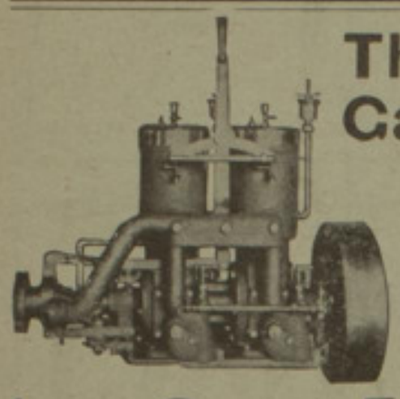

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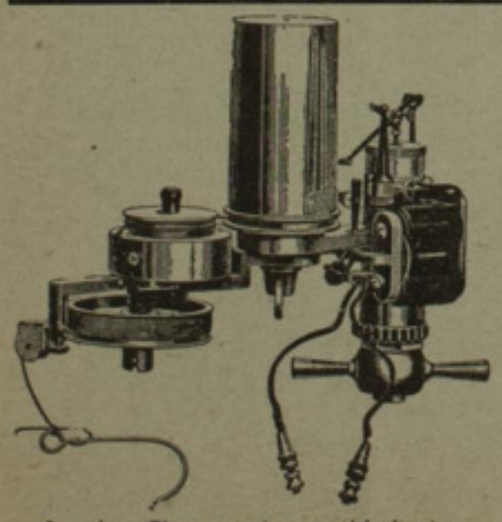

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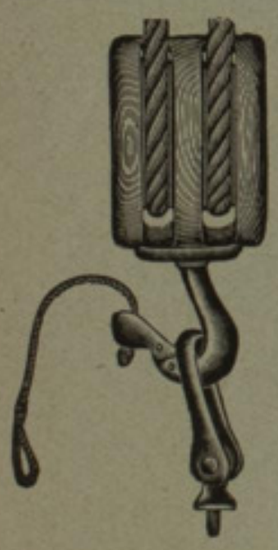

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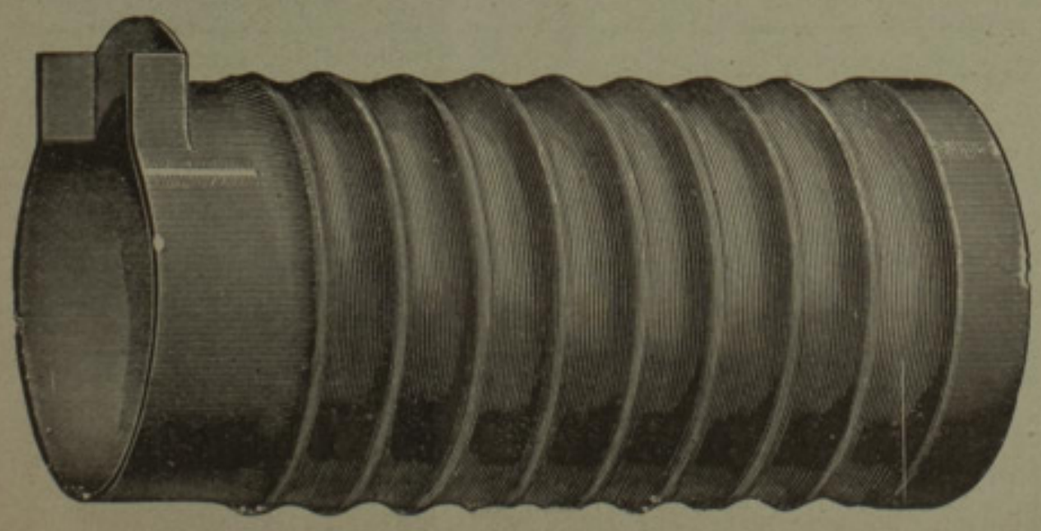

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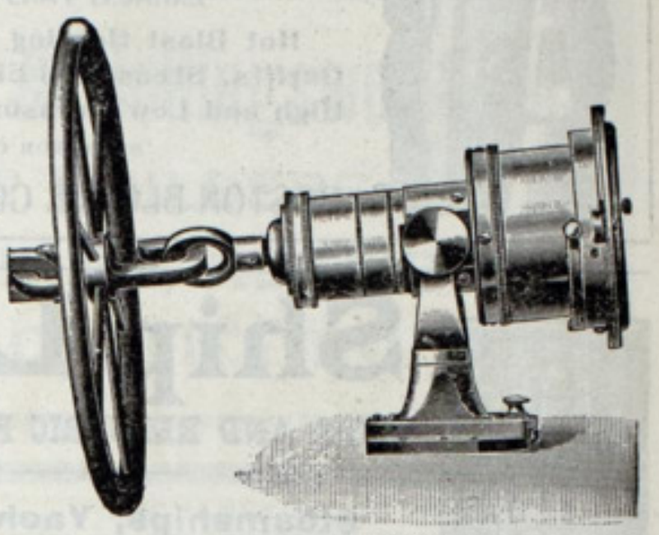

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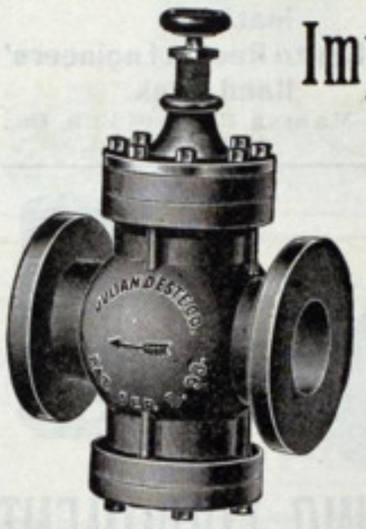

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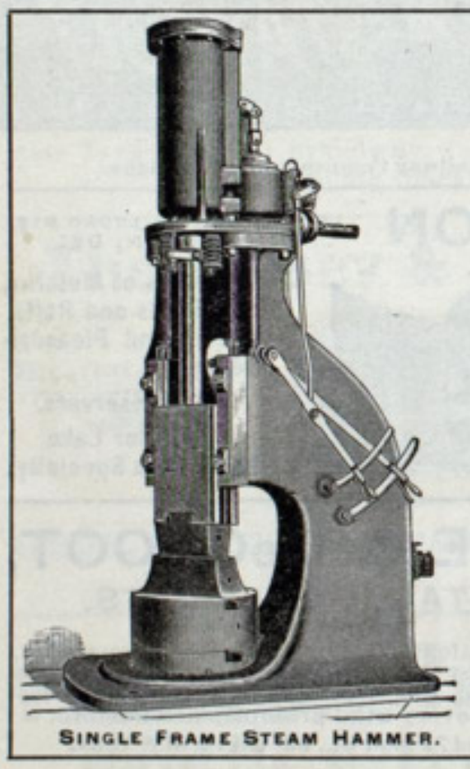

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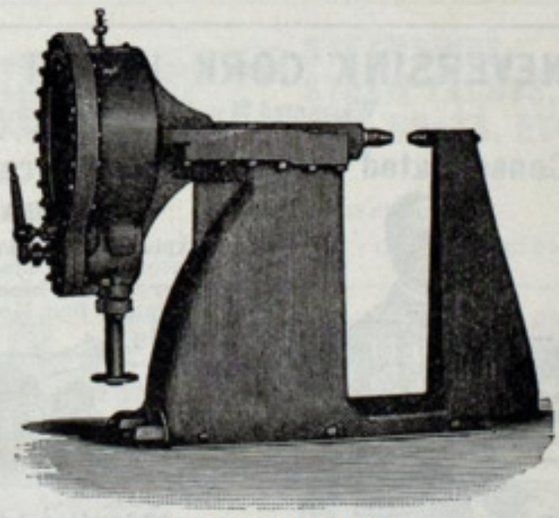

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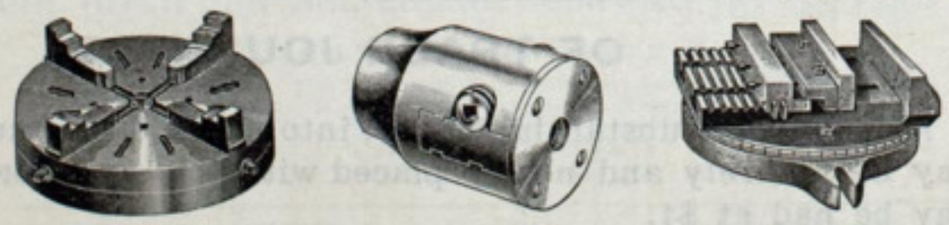

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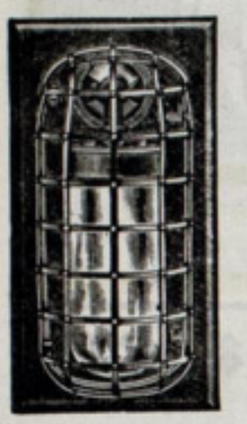

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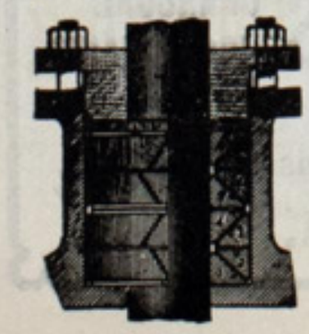

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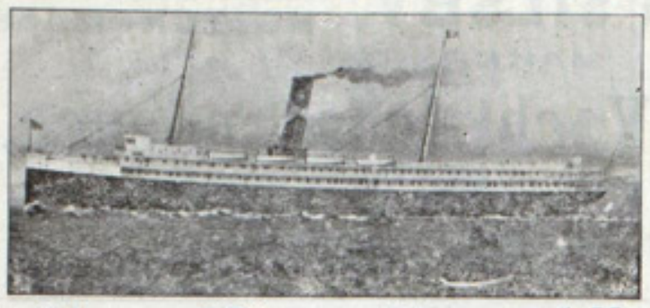

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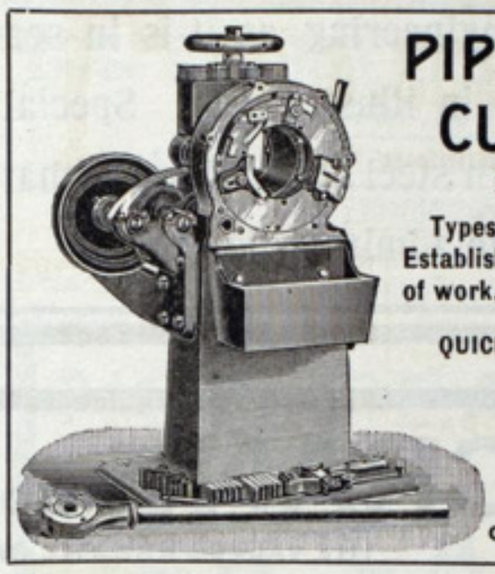

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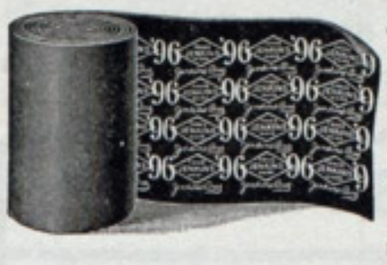

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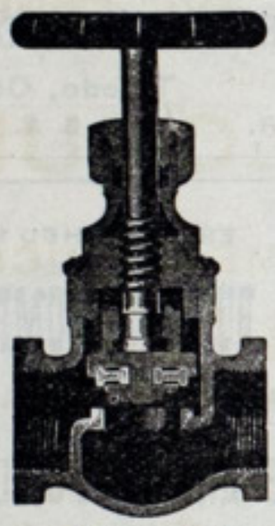

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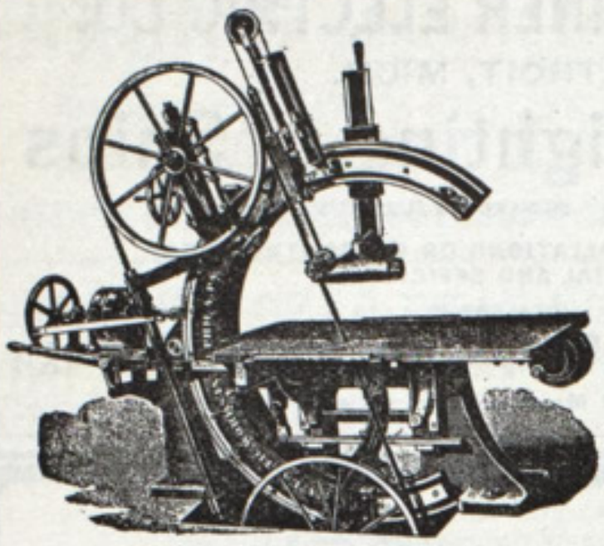

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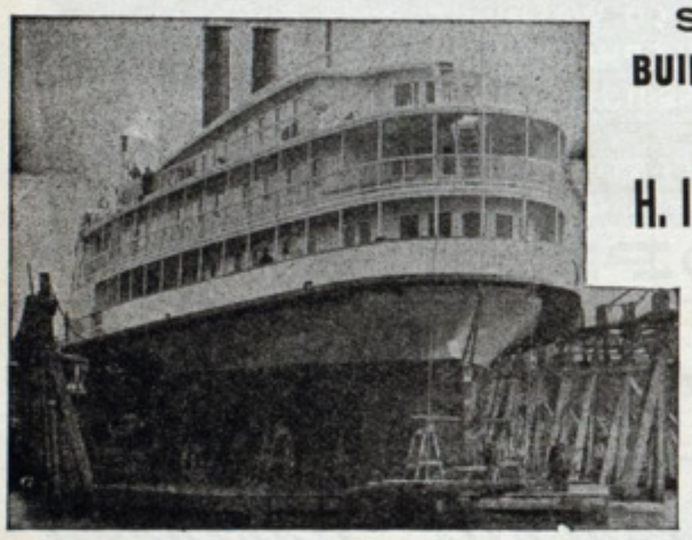

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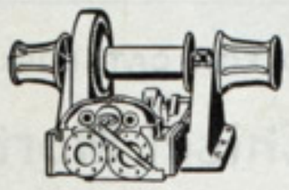

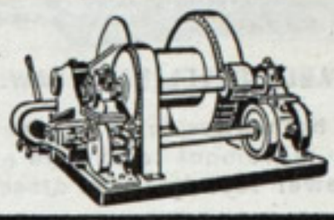

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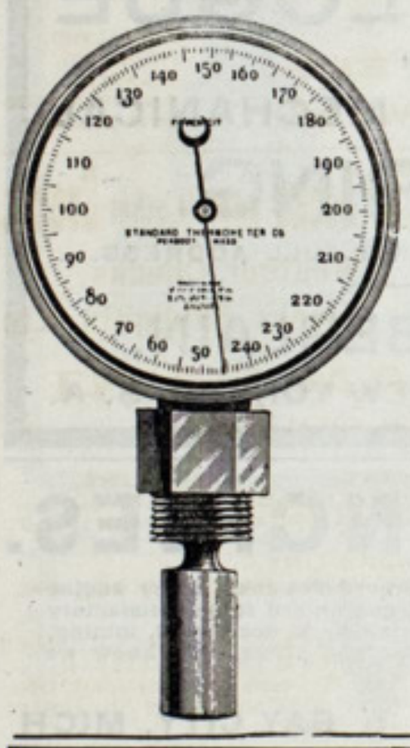

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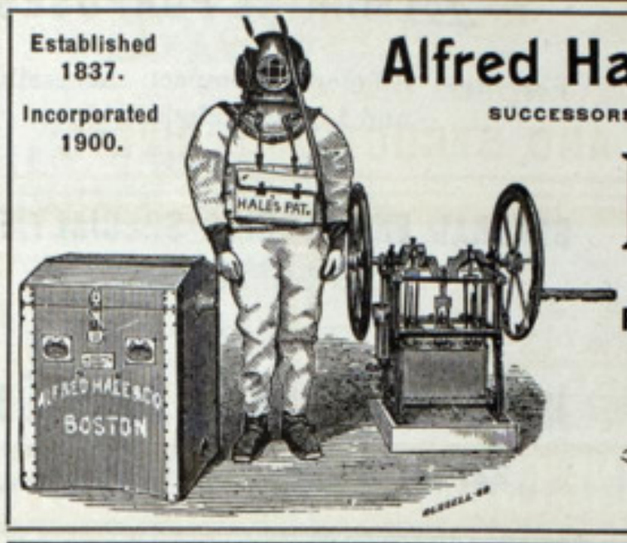

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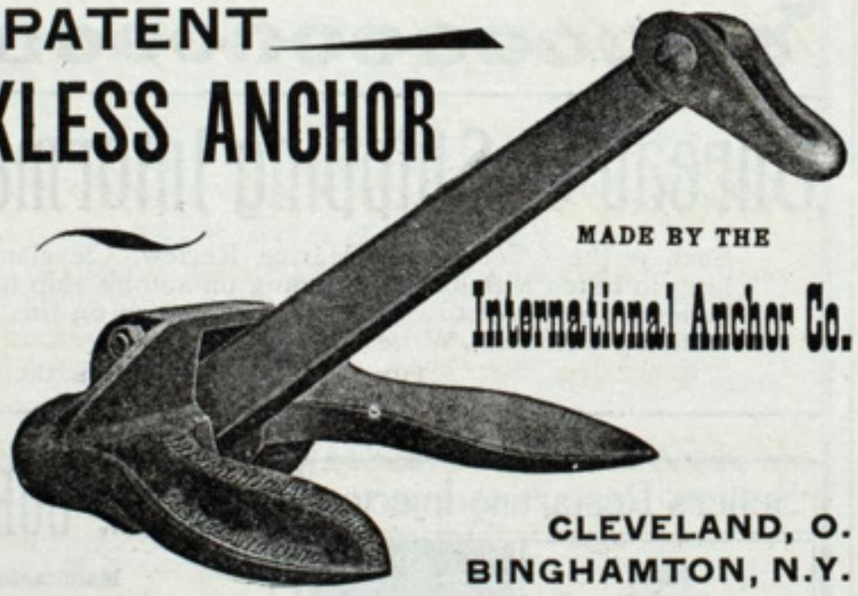

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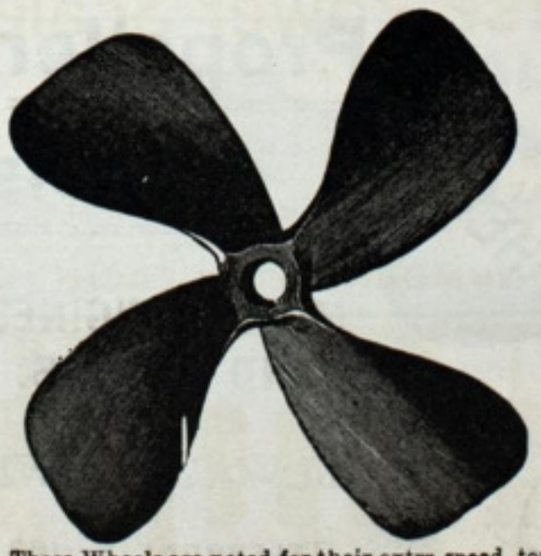

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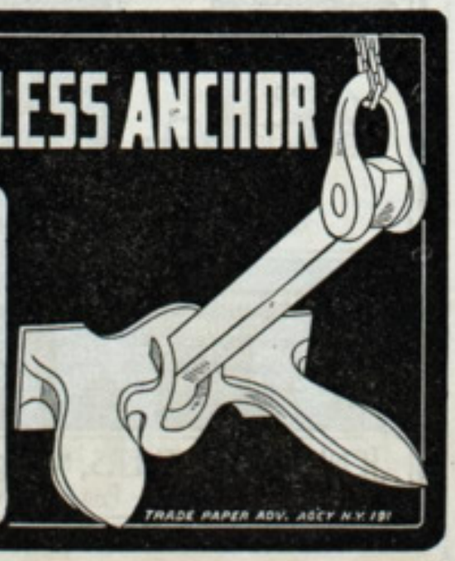

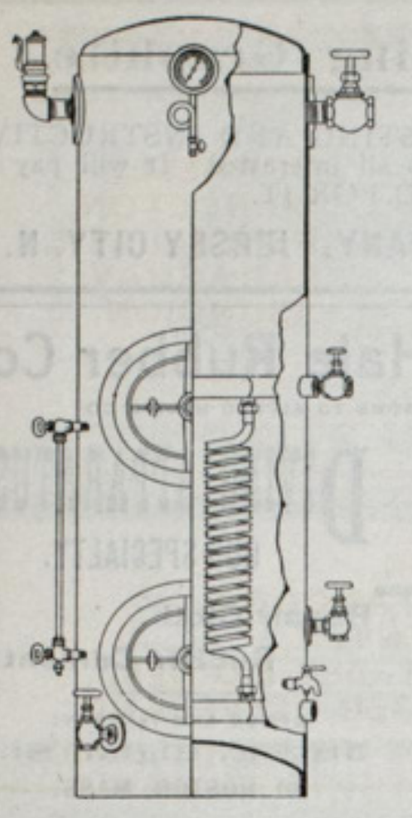

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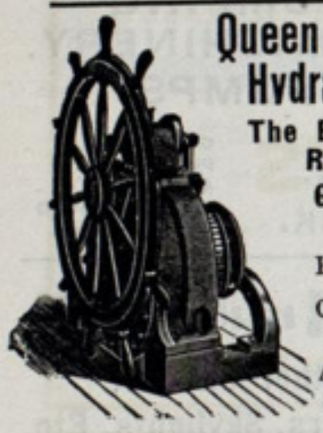

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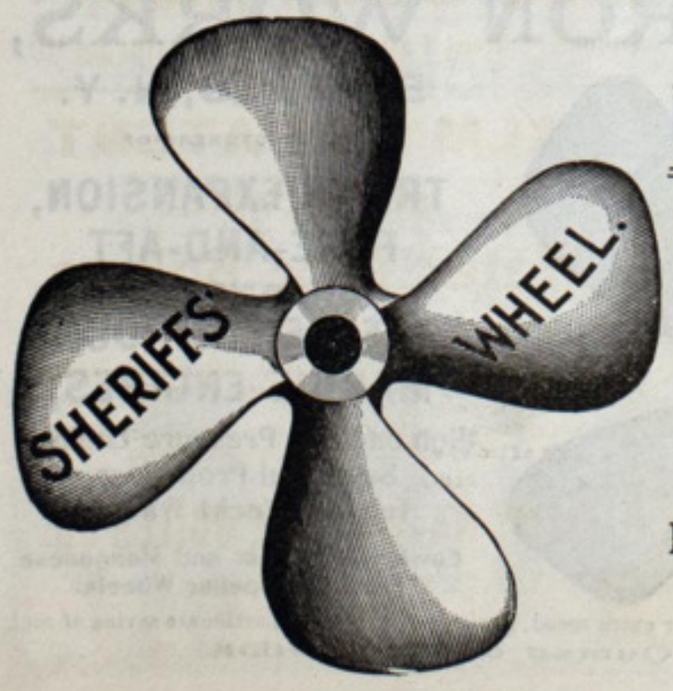

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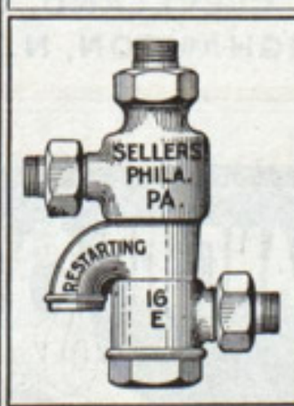

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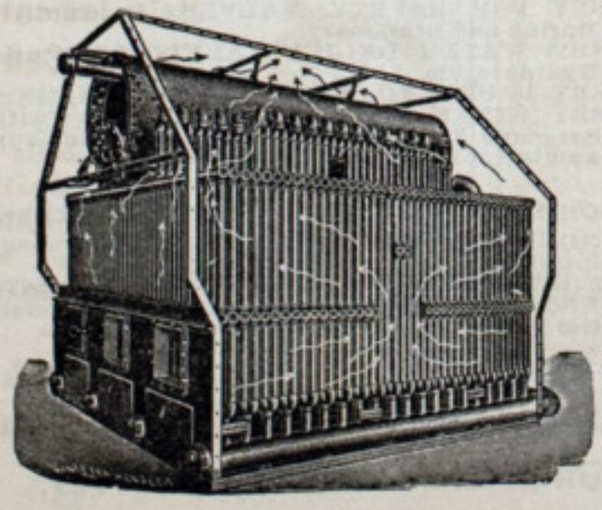

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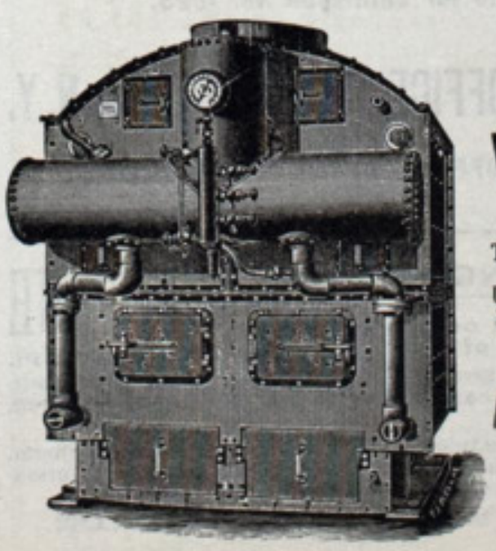

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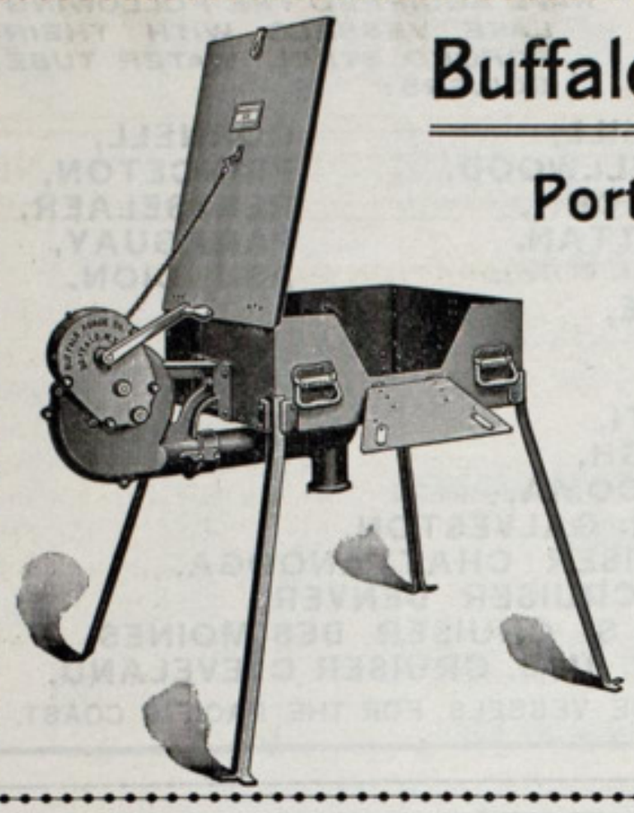

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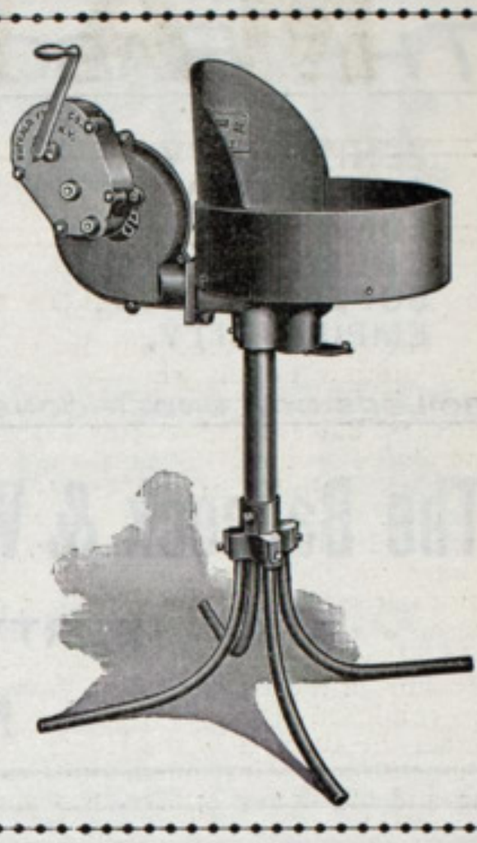

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